

RAILROAD GAZETTE

QUARTO VOL. VII—NO. 52
EIGHTEENTH YEAR.

A Journal of Transportation, Engineering and Railroad News.

\$6.00 PER ANNUM.
POSTAGE FREE.

NEW YORK: 73 Broadway.

SATURDAY, DECEMBER 25, 1876.

CHICAGO: 77 Jackson St.

CHRISTMAS!

It is an exceedingly difficult matter to select an appropriate Christmas present. That it shall be not too expensive, durable, often used, handsome, appropriate and valuable to the recipient are considerations that indeed to reconcile, unless it be that your friend is engaged in some department of

RAILROAD SERVICE,

or has a

"MECHANICAL TURN OF MIND;"

then present him with a copy of the

CATECHISM OF THE LOCOMOTIVE,

and he will not forget it, but will grow in knowledge and gratitude during the whole of the year 1876.

POPULAR SCIENCE MONTHLY,

(Established May, 1872.)

Conducted by Prof. E. L. YOUNG.

The POPULAR SCIENCE MONTHLY was started to promote the diffusion of valuable scientific knowledge in a readable and attractive form, among all classes of the community, and has thus far met a want supplied by no other periodical in the United States.

The great feature of the magazine is that its contents are not what science was ten or more years since, but what it is to-day, fresh from the study, the laboratory and the experiment; clothed in the language of the authors, inventors and scientists themselves, which comprise the leading minds of England, France, Germany and the United States. Among popular articles, covering the whole range of NATURAL SCIENCE, we have the latest thoughts and words of Herbert Spencer and Professors Huxley, Tindall and B. A. Proctor. Since the start it has proved a gratifying success to every friend of scientific progress and universal education; and those who believed that science could not be made anything but dry study are disappointed.

The press all over the land is warmly commending it. We subjoin a few encomiums from those recently given:

"That there is a place for the POPULAR SCIENCE MONTHLY no one can doubt who has watched the steady increase of interest in scientific investigation manifested in this country, not only by a select class but by the entire community."—*New York Times*.

"A journal which promises to be of eminent value to the cause of popular education in this country."—*New York Tribune*.

"It is, beyond comparison, the best attempt at journalism of the kind ever made in this country."—*Home Journal*.

"The initial number is admirably constituted."—*Evening Mail*.

"We think it is not too much to say that this is the best first number of any magazine ever published in America."—*New York World*.

"It is just what is wanted by the curious and progressive mind of this country, and ought to be widely circulated."—*New York Evening Post*.

"It is the first successful attempt in this country to popularize science in the pages of a monthly."—*New York School Journal*.

"Not the least entertaining because it is instructive."—*Philadelphia Age*.

"The MONTHLY has more than fulfilled all the promises which the publishers made in the prospectus of publication."—*Niagara Falls Gazette*.

"It places before American readers what the ablest men of science throughout the world write about their speculations, speculations and discoveries."—*Providence Journal*.

"This is a highly suspicious beginning of a useful and much-needed enterprise in the way of publication, for which the public owe a special debt of obligation to Messrs. D. Appleton & Co."—*Boston Gazette*.

"This new enterprise appeals to all who are interested in the laudable effort of diffusing that information which is best calculated to expand the mind and improve the conditions and enhance the worth of life."—*Golden Age*.

"Just the publication needed at the present day."—*Montreal Gazette*.

"This new magazine, in our estimation, has more merit than the whole brood which have preceded it."—*Quebec Press*.

"In our opinion, the right idea has been happily hit in the plan of this new monthly."—*Buffalo Courier*.

THE WEAR OF RAILS

AFFECTED BY THEIR QUALITY.

BY FRED. J. BLADE.

An illustrated 24-page pamphlet discussing the different methods of manufacture and material used in rail making, together with some valuable statistics as to their wear. Appendix by F. A. Childs, on the Comparative Value to a Railroad Company of Rails of Different Quality.

PRICE 25 CENTS.

Address THE RAILROAD GAZETTE,

73 Broadway, New York.

PORTLAND CEMENT,

For Walks, Cisterns, Foundations,

Stables, Cellars, Bridges,

Reservoirs, &c.

Remit six cents postage for a Practical Treatise on

Cement.

S. L. MEBREANT & CO.,

76 South street, N. Y.

TRI-NITRO-GLYCERIN,

THE MOST POWERFUL EXPLOSIVE KNOWN.

Mica Blasting Powder,

The New Explosive, whose safety, power and economy may be estimated from the subjoined letter:

HOOAC TUNNEL CONTRACT.

NORTH ADAMS, MASS., Aug. 30, 1874.

DEAR SIR.—Within the last six months we have used some 30,000 lbs. of your "Mica Powder," and with the exception of the "Tri-Nitro-Glycerin" itself have had no better explosive in our works here. It is light to carry, safe (as far as that term can be applied to any explosive) to handle, "nimble" to explode, and thorough in combustion—a very essential quality in all preparations of Nitro-Glycerin.

Where pure Nitro-Glycerin is not wanted we do not ask any better substitute than Mica Powder.

Yours truly, W. SHANLY.

GEO. M. MOWBRAY, Esq., North Adams.

Mowbray's "Powder Keg" Battery, for simultaneously firing a series of mines or drilled holes.

Gutta Percha insulated leading wire for electric blasting.

Electric Fuses for sub-marine blasting.

Electric Fuses for rock blasting.

Gutta Percha and Cotton-covered Electric Wire.

Tape Fuse Exploders for Contractors' use, etc., etc., etc.

All the above materials are manufactured by the undersigned, guaranteed to perform as represented, being the result of seven years' experience at the Hooac Tunnel, and in various sub-marine works throughout the State.

GEO. M. MOWBRAY,

Hooac Tunnel Tri-Nitro-Glycerin and Gutta Percha Works, North Adams, Mass.

New York Agency, A. W. DESPARD, 23 Cedar Street, New York.

EDWARD S. PHILBRICK,

CIVIL ENGINEER.

Special attention given to the design and construction of iron bridges and other structures in iron.

No. 19 West street, Boston, Room 30.

WILLIAM HENRY SEARLES,

CONSULTING

CIVIL AND MECHANICAL ENGINEER

Special attention given to the several departments of railway engineering.

80 BROADWAY, Room 47 NEW YORK.

JOHN M. GOODWIN,

CIVIL ENGINEER AND RAILWAY EXPERT.

Address with the Secretary of the American Society of Civil Engineers, No. 14 West 23d street, New York.

ARTHUR VON BRIESEN,

SOLICITOR OF AMERICAN AND FOREIGN PATENTS.

258 Broadway, Cor. Warren St.,

ATTORNEY AND COUNSELLOR AT NEW YORK.

LAW IN PATENT CASES.

All orders promptly attended to. Information gratis.

"TAYLOR'S"

HAMMERED CRUCIBLE CAST STEEL.

LOCOMOTIVE TIRES,

(Stamped "Taylor's, Leeds, England.")

BEST YORKSHIRE BAR IRON, of great strength and soundness, and capable of receiving the highest finish. AND

BOILER PLATES.

RANDALL & JONES,

Sole representatives in the United States and Canada.

10 Oliver street, Boston.

W. LOUGHRIDGE'S AIR-BRAKE.

Adopted and in daily use on all the passenger rolling stock Baltimore & Ohio, Connellsville & Pittsburgh, Marietta & Cincinnati, Sandusky & N. Central Ohio, W. P. & S., Orange & Alexandria, Western Maryland, Cumberland & Pa., (with 182 feet of zig-zag grades to the mile), and others. The cheapest in equipment and repair, and the most effective brake in the world for general purposes. Better results guaranteed in every-day use than were accomplished in the recent great competitive trial of brakes in England.

I challenge all owners of competing brakes to meet me on public trial at the great Centennial in 1876. Rights low, as I am sole owner of my patents.

Refer to any of the executive officers, master mechanics, conductors or engineers on the above roads. P. O. BOX 441, Baltimore, Md.

A. L. DUNTON & CO.,

MACHINERY COMMISSION AGENTS,

213 North 4th st., Philadelphia.

Agents for the Bay State Iron Works'

ENGINES AND BOILERS,

the Allison Patent Portable Engine and Boiler, the Selden Steam Pumps, Eureka Patent Self-Acting Steam Hammer, Iron Tubular Barrows and Trucks, etc., etc., etc.

Also, Busby's Patent

Double-Acting Wooden Hand-Pump,

which never freezes and will throw water over an ordinary house, State and County rights of this pump for sale.

Engines, Boilers, Steam, Hand and Power Pumps, Machinists' Tools, Locomotives, Printing Machines, and Railroad and Machinists' Supplies. Good second-hand Machinery always on hand at lowest prices.

GEO. R. MENEELY & CO.,

West Troy, N. Y.

Manufacturers of Hopkins' Patent Non-Heating

Lead-Faced Journal Bearings.

Made of best hard bronze to any pattern; absolutely non-heating, and yielding double the mileage of ordinary brasses. Adopted for the "Fast Mail."

CAST STEEL WORKS

OF FRIED. KRUPP,

Essen, Rhineish Prussia.

TIRES, AXLES, SPRING STEEL,

Crank Pins, Connecting Rods, Piston Rods, Boiler Plates, &c., &c.

Special Tool Steel,

A Very Superior Article, Suitable for All Kinds of Cutting Tools, Dies, &c.

Represented by

THOS. PROSSER & SON,

15 Gold street, New York.

MALLEABLE IRON CASTINGS

McCONWAY, TORLEY & CO.,

MANUFACTURERS,

351 TO 359 LIBERTY AVENUE,

Pittsburgh, Pa.

ATLAS IRON WORKS

PITTSBURGH, PA.

Light Locomotives,

FROGS (with our patent hollow cast-steel points, if required). Crossings, Switches, Cylinders, Axle Blocks, to 100 tons; Steam Engines, from 10 to 40 in diameter.

RAILWAY EQUIPMENTS.

THOS. N. MILLER, President.

PHILADELPHIA

SCALE & TESTING MACHINE

WORKS.

RIEHLER BROS., Ninth street, above Master, Philadelphia.

Patent Railroad Truck, Wagon, Furnace Charing Scales, Crane Scales, &c., and Testing Machines.

HALL'S SYSTEM OF AUTOMATIC

ELECTRIC RAILWAY SIGNALS,

The Most Wonderful Invention for the

Security of Life and Property

Ever Made.

Trains Run Automatically by Intervals of Space.

Accidents from head and rear collisions, misplaced switches, open draw-bridges, railroad and highway crossings absolutely prevented. Business of railroads can be increased four fold above what may be done by any other system, it being perfectly safe to dispatch trains within four minutes' time of each other. A most perfect substitute for the steam-whistle. Perfect simplicity in working of trains. Fixed signals visible and audible to indicate almost all classes of danger. Human agency (except that of the engineer) no longer required for the protection of trains.

The system is inexpensive when its great importance is considered. No railroad doing a large business can afford to be without it. It will pay for itself the first year. All patents pertaining to the above are owned by THE HALL RAILWAY SIGNAL COMPANY, who are prepared to negotiate with railroad companies for the right to use their system of signals. They are also prepared to furnish all the electrical instruments, batteries and other materials required for their application. Address all communications to

THE HALL RAILWAY SIGNAL COMPANY

THOMAS S. HALL, General Manager,

West Meriden, Conn.

CHARLES PARKER, President.

ALVAN W. HALL, Secretary.

J. S. KENNEDY & CO.,

BANKERS AND MERCHANTS,

41 CEDAR CORNER WILLIAM STREET,

New York.

Buy and sell Railroad Investment Securities, Collect Coupons and Dividends, Negotiate Loans and draw Bills of Exchange on London.

Agents of the

CANBRIA IRON COMPANY,

of JOHNSTOWN, Pa., for the sale of their IRON and STEEL RAILS.

All business relating to the Construction and Equipment of Railroads undertaken.

AUG. J. BROWN & SON,

BANKERS,

No. 59 Liberty St., New York City,

Transact a general Banking business, and give particular attention to the negotiation of Western Railroad Securities. Also City and County Bonds negotiated.

THE WHARTON

RAILROAD SAFETY SWITCH.

THE MAIN TRACK ABSOLUTELY UNBROKEN AND CONTINUOUS.

Adopted by the Pennsylvania Railroad, Philadelphia, Wilmington & Baltimore Railroad, and other leading Companies.

Descriptive circulars, drawings and testimonials furnished on application to

THE WHARTON RR. SWITCH CO.,

Office, 25 South 3d street.

Works, Washington ave., bet. 2nd and 3rd sts.

Box No. 3353, Philadelphia, Pa.

LOWTHORP & HENDERSON,

ENGINEERS AND BUILDERS

OF

BRIDGES AND TURN TABLES

OF WROUGHT IRON, OR COMBINATION OF WROUGHT AND CAST.

F. C. LOWTHORP, C.E. J. J. HENDERSON,

RAILROAD IRON.

50 and 55 lbs. in store at New Orleans.

50 and 55 lbs. in store at New York.

Bessemer Steel Rails.

45, 55 and 60 lbs. in store at New York.

For sale by

DANA & COMPANY,

18 William street.

BURR & COMPANY,

Manufacturers of Waterman & Russell's

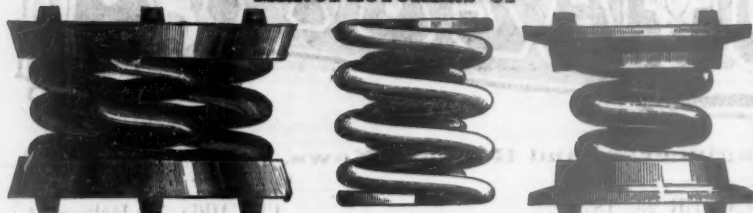
Patent Iron-Strapped Blocks,

AND ROPE-STRAPPED BLOCKS

31 FROCK SLIP, New York.

CULMER SPRING CO.

MANUFACTURERS OF



RAILWAY CAR SPRINGS,

Spiral Buffer, Freight Bolster, Journal and Equalizing Bar Springs.

SPIRAL SPRINGS, OF ALL DESCRIPTIONS, A SPECIALTY.

OFFICE & WORKS, Cor. 26th and LIBERTY STS.

HENRY A. BREED,
General Manager and Treasurer.

PITTSBURGH, PA.

Nichols, Pickering & Co.,

ELLIPTIC, VOLUTE AND SPIRAL
SPRING MANUFACTURERS,

Sole Manufacturers of Thomas' Patent

CAST STEEL REVERSIBLE NUT LOCK WASHERS,

For Fish-joints, Cars, Agricultural Machinery,
Carriages, Wagons, etc., etc., or

WHEREVER NUTS AND BOLTS ARE USED.

The nut can be removed with a wrench as
usual, without injury, and again replaced, when
it is held as firmly as before.

NICHOLS, PICKERING & CO.,

18th st. and Pennsylvania av.,
PHILADELPHIA, PA.

N. & A. MIDDLETON & CO.,

SOLE MANUFACTURERS OF



Godley Buffer
Bolster and Journal Springs.

Buntin Iron Car Seat.

Principal Office and Manufactory, No. 945 Ridge Ave., Philadelphia.
OFFICES: 234 S. Fourth St., Phila., and 122 Randolph St., Chicago, Ill.

VOSE, DINSMORE & CO.,

NATIONAL SPRING WORKS,

Manufacturers of Volute Buffer, India Rubber, Rubber Center Spiral
Compound Spiral, Dinsmore and other

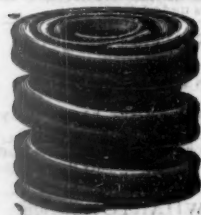
RAILWAY CAR SPRINGS.

PRINCIPAL OFFICE, NO. 32 WARREN ST., N. Y.

Branch Warehouses:

No. 194 LAKE ST., CHICAGO, ILL.

No. 720 N. SECOND ST., ST. LOUIS, MO.



"Dinsmore" Spring.

COLUMBIA CAR SPRING CO.,

322 7th Ave., cor. 28th St.
NEW YORK.

BRANCHES:

19 Federal St., Boston,

123 Central Ave., Cincinnati,

174 Randolph St., Chicago.



THORNE, DeHAVEN & CO.

21st Street, above Market,
PHILADELPHIA.

DRILLING MACHINES.



PORTABLE DRILLS. Driven by power in any
direction, self-feed and convenient adjustment.

RADIAL DRILLS. Self-feed—large adjustable
box table—separate base plate, every convenience.

VERTICAL DRILLS. Self-feeding—of new and
improved designs.

MULTIPLE DRILLS. For boiler work, etc., 2 to
20 spindles, fed and returned by power or hand,
together or separately.

HORIZONTAL BORING AND DRILLING
MACHINES. For large pieces—with boring head,
adjustable, vertically and horizontally.

SPECIAL DRILLS. For special work. Gun Blank
Drills, Coal Drills, &c., built to order.



Copyright secured.

PITTSBURGH CAST-STEEL SPRING WORKS.

A. FRENCH & CO.

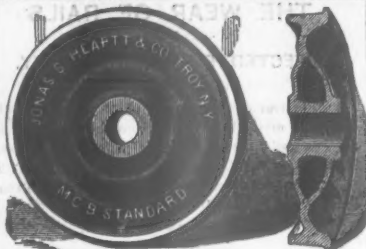
MANUFACTURERS OF

CAST-STEEL SPRINGS,

FOR
RAILROAD CARS & LOCOMOTIVES,
From best Cast Steel.

Office and Works: Cor. Liberty and 21st
Streets, Pittsburgh, Pa.

ST. LOUIS BRANCH—M. M. DUCK & CO.
CHICAGO BRANCH—146 E. LAKE ST.



JONAS S. HEARTT & CO.,

MANUFACTURERS OF

RAILROAD CAR WHEELS

AND

STREET CAR WHEELS

(BOSWORTH PATENT),

Troy, New York.

THE HAMILTON STEELED-WHEEL CO., OF PHILADELPHIA

W. G. HAMILTON, President.

WM. M. BRACKMAN, Treasurer.

CHAPMAN BIDDLE, Solicitor.



OFFICES.

68 NORTH SECOND STREET
Philadelphia, Pa.

24 BROADWAY,
New York.

Grant Licenses to manufacture and use Car Wheels made under Patents of W. G. Hamilton and Geo. Whitney, adding largely to the strength of the metal, and rendering available the use of Non-Chilling Irons.

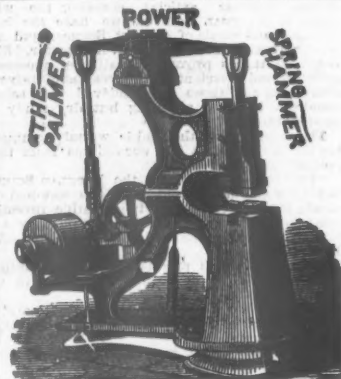


The Bolt-Heading machine shown above, we guaran-
tee superior to any Header produced in the world.
It forges any imaginable shape of head and any
desired length of bolt. For full particulars address

S. C. FORSAITH & CO.,

Manchester, N. H.

N. B.—These machines we have especially adapted and designed to meet the wants of Locomotive
Works, Car Shops, Railroad Repair Shops and Bolt Works.



Of this Power Hammer we are now building
sizes adapted to all classes and descriptions of
Forgings up to six-inch square steel.

In power, range of work, durability, ease of
application, simplicity and cheapness, they meet
any Hammer before the public. For descriptive
price lists, etc., address

S. C. FORSAITH & CO.

Manchester N. H.

VERONA TOOL WORKS;

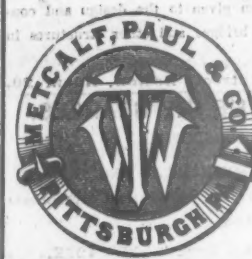
331 Penn Ave., Pittsburgh, Pa.

Make a Specialty of

RAILROAD TRACK TOOLS,

Also Sole Manufacturers of

THE VERONA NUT LOCK.



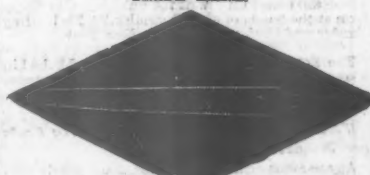
EDWIN HARRINGTON & SON, BLACK DIAMOND FILE WORKS.

TRADE MARK.



MANUFACTURERS OF
ENGINE LATHES,
PLANERS, BORING MILLS, UPRIGHT DRILLS,
CENTERING AND TAPPING MACHINES,
LATHES AND PLANNER CHUCKS, HAND
SHEARING AND PUNCHING MA-
CHINES, THREE TOOL SHAFT-
ING RESTS, AND OTHER
MACHINISTS' TOOLS.

Corner North 15th St. and Pennsylvania
Avenue, Philadelphia, Pa.



G. & H. BARNETT.

No. 39, 41 & 43 Richmond Street
PHILADELPHIA.

BARNUM RICHARDSON CO., SALISBURY, CONN.,



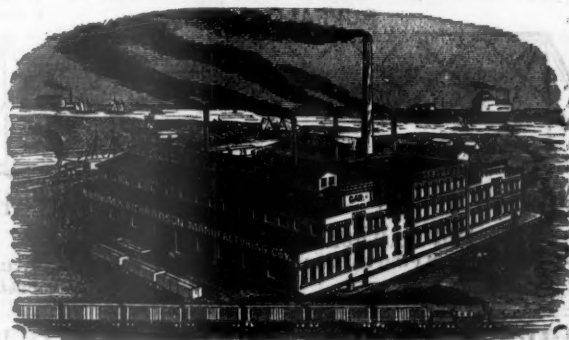
MANUFACTURERS OF
CHARCOAL PIG IRON FROM SALISBURY ORES,
AND CHILLED  **CAR WHEELS.**

All Work from this Establishment made from Salisbury Iron,
AND WARRANTED.

ADDRESS OR,
WM. H. BARNUM, Pres't. **ALBERT ALLING, Agent for Sale of Pig Iron,**
LIME ROCK, CONN. **64 SOUTH JEFFERSON ST., CHICAGO, ILL.**

BARNUM & RICHARDSON MANUFACTURING CO.,

64 South Jefferson Street, Chicago, Ill.



MANUFACTURERS OF
Chilled Car and Locomotive Wheels, from Pure Salisbury Iron,

ALSO MANUFACTURERS OF
CAR AND ALL OTHER DESCRIPTIONS OF CASTINGS.

All Work Warranted.

WM. H. BARNUM, President, **ALBERT ALLING, Gen'l Manager,**
Lime Rock, Conn. **Chicago, Ill.**

DAVENPORT, FAIRBAIRN & CO.,



CAR WHEELS AND RAILROAD CASTINGS,
ERIE, PA.

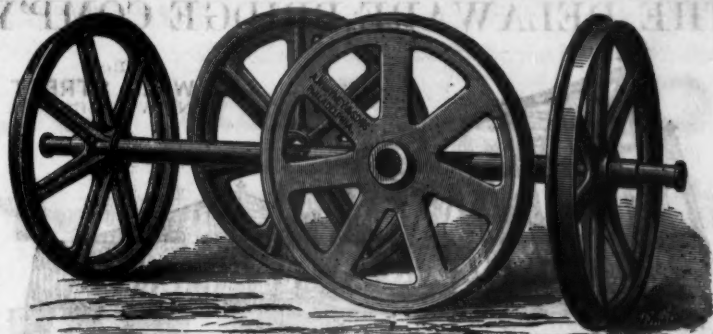
Capacity 350 Wheels per day.

WHEELS AND AXLES
MADE OF THE BEST STOCK
AND IN THE MOST CAREFUL MANNER
FURNISHED SEPARATELY OR "FITTED" MAKING COMPLETE SETS

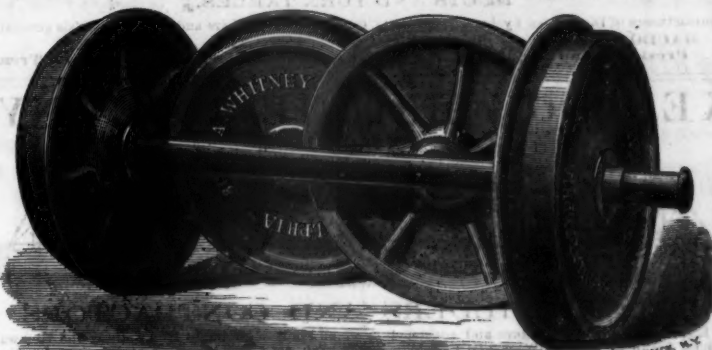
TAYLOR IRON WORKS
ON THE LINE OF THE CENTRAL N.Y. & N.J. R.R.
HIGH BRIDGE, N.J.
CAR WHEELS & AXLES

DRAW HOOKS & FORGINGS.
LEWIS H. TAYLOR, Pres't.
S. P. RABER, Supt. JAS. H. WALKER, Sec'y & Treas.
NEW YORK OFFICE 93 LIBERTY ST.

STEEL, TIRED WHEELS
MADE UNDER PATENT
SAX & KEAR'S
FOR LOCOMOTIVE AND TENDER
AND PASSENGER CAR SERVICE



A. WHITNEY & SONS, CAR WHEEL WORKS,
Callowhill and Sixteenth Streets, Philadelphia, Pa.



BALTIMORE CAR WHEEL COMPANY,

OFFICE 15 SOUTH STREET,
Manufacture Wheels

FOR
City and Steam Railways,
With or without Axles.

WHEELS OF ALL PATTERNS

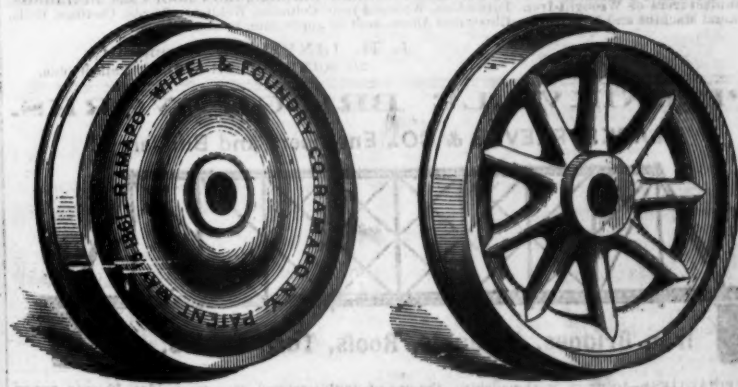
Made to Order and in Stock

This Company using strictly Baltimore Charcoal Iron, (which has no superior and few equals, for making Car Wheels,) and annealing their Wheels by the most approved process, warrant them free from strain, and equal in tenacity and uniformity of chill to any made.

W. S. G. BAKER, President.
J. M. LAWFORD, Secretary.

Works, corner Essex and Concord Streets, Canton, Baltimore, Md

RAMAPO WHEEL AND FOUNDRY COMPANY.



MANUFACTURERS OF

Wheels for Drawing Room and Sleeping Coaches, Locomotives, TENDERS, PASSENGER AND FREIGHT CARS.

W. W. SNOW, Sup't & General Manager, Ramapo, Rockland Co., N. Y.

G. G. LOBDELL, Pres't **W. W. LOBDELL, Sec'y.**
P. N. BRENNAN, Treas.

Lobdell Car-Wheel Co.,
WILMINGTON, DEL.

Manufacturers of
LOBDELL'S PATENT COMBINATION (DOUBLE PLATE),
IMPROVED SINGLE PLATE and IMPROVED HOLLOW SPOKE WHEELS,

Furnished with or without Axles; adapted for Broad and Narrow Gauge and Street Roads.

MAKERS OF IRON AND BRASS CASTINGS, ETC.

Also Manufacturers of **CHILLED ROLLS**, for Paper, Brass, Copper and Rolling Mills.

THE DELAWARE BRIDGE COMP'Y



Office
52 WALL STREET
NEW YORK.

ENGINEERS AND CONTRACTORS FOR THE CONSTRUCTION
OF IRON AND WOODEN BRIDGES, STEEL SUS-
PENSION BRIDGES, ROOFS, VIA-
DUCTS AND TURN TABLES.

Manufacturers of Die Forged Eye-bars, Truss Bolts, Compression Members and Bridge materials generally.
G. MACDONALD, President and Engineer. WM. M. FINCKE, Secretary and Treas.

KELLOGG BRIDGE COMPANY.

OF BUFFALO, N. Y.,



BRIDGE BUILDERS AND CONTRACTORS.

Engaged in the manufacture and construction of all kinds of Wrought Iron Railway and Highway Bridges, Viaducts, Trestle Work, Turn Tables, Roofs and other Iron Structures; also Combination Bridges (of Wood and Iron). Make Railroad work a specialty, and are also prepared to furnish Contractors and others with all kinds of finished iron material for Bridges, Roofs, &c.

Send for illustrations.

Office: Buffalo, N. Y. P. O. Drawer, 181.
CHARLES KELLOGG, Pres't.
GEORGE BEALS, Vice-Pres't.

S. D. BARLOW, Jr., Sec'y & Treas'r.

DETROIT BRIDGE AND IRON WORKS.

OF DETROIT, MICH.,



ENGINEERS AND MANUFACTURERS OF

Iron Bridges. Iron Roofs, Etc.

WILLARD S. POPE, Pres't and Engineer

WM. C. COLBURN, Sec and Treas.

THE KEYSTONE BRIDGE COMP'Y,

PITTSBURGH, PA.,

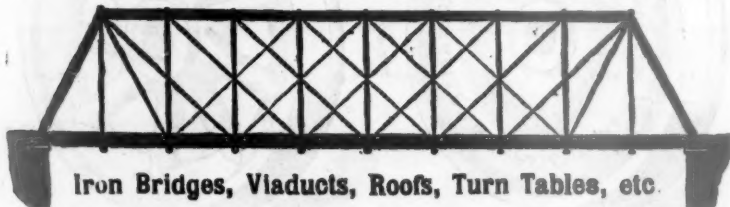


Engineers and Builders of WROUGHT-IRON and WOODEN BRIDGES, IRON ROOFS and BUILDINGS
Manufacturers of Wrought-Iron Turntables, Wrought-Iron Columns, Weldless Chords, Castings, Rolls,
General Machine and Mill Work. Illustrated Album sent on application to undersigned.

J. H. LINVILLE, President,
218 SOUTH-FOURTH STREET, Philadelphia.

PHOENIXVILLE BRIDGE WORKS.

CLARKE, REEVES & CO., Engineers and Builders of



Iron Bridges, Viaducts, Roofs, Turn Tables, etc.

SPECIALTIES:—Accurate workmanship; the use of double-refined iron; no welds; Phoenix upper
chords and posts, the best form of strut known; all work done on the premises, from ore to finished
bridge.

ILLUSTRATED ALBUM mailed on receipt of 75 cts. at 410 WALNUT STREET, PHILADELPHIA, PA.

The Watson Manufacturing Company.



PATERSON, NEW JERSEY,

BUILDERS OF

Post's Patent Diagonal Truss Bridges.

OF IRON, WOOD, OR WOOD AND IRON COMBINED, FOR

Railroads and Highways, Roofs, Turn-Tables and General Machine Work.

NEW YORK OFFICE, 303 BROADWAY.

W. G. WATSON, Pres.

J. WATSON, Vice-Pres.

A. J. POST, Engineer

THE AMERICAN BRIDGE CO.



A. B. STONE, New York, President. EDWARD HEMMERLE, } Engineers.
H. A. RUST, Vice-Pres't & Gen'l Manager. W. G. COOLIDGE, Sec'y.

MANUFACTURERS AND BUILDERS OF

BRIDGES,

Roofs, Turning-Tables, Pivot Bridges, Iron Trestles Wrought Iron Columns
Heavy Castings.

GENERAL IRON AND FOUNDRY WORK.

BUILDERS OF

PNEUMATIC, MASONRY, AND SCREW-PILE SUBSTRUCTURES.

Iron Bridges and Roofs upon the principal Railroads in the United States illustrate designs and
attest the character and extent of products of Works.
Proposals accompanied by Plans, Specifications and Lithographs promptly submitted upon
application.

WORKS: Cor. Egan and Stewart Aves. | OFFICE: No. 210 LaSalle St., Cor. Adams.
Address THE AMERICAN BRIDGE CO., Chicago.

BALTIMORE BRIDGE CO.,

54 Lexington Street, Baltimore.



C. SMILER SMITH, Pres't & Ch. Eng.,
O. C. WRENSHALL, Supt. of Erection,
O. H. LATROBE, A. Eng., Sec. & Treas.,
C. W. BAYLEY, Superintendent.

WESTERN OFFICE,
417 Pine Street, St. Louis.
EASTERN OFFICE,
54 Lexington Street, Baltimore.

F. H. SMITH, A. Eng. & Gen. Supt., Construction Office, Wilmington, Del.

Design and Construct Iron, Steel and Composite Bridges and Roofs of any form or span desired.
Special attention is called to our Wrought-Iron Trestles and Viaducts, patented in United States
England, France and Belgium, and built of any height or length.
Lithographs and information promptly furnished.

NIAGARA BRIDGE WORKS,

BUFFALO, N. Y.,

BUILDERS OF IRON LATTICE BRIDGES
FOR RAILROADS AND HIGHWAYS.

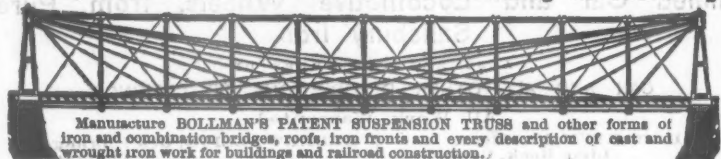
PLATE GIRDERS, COMPOSITE BEAMS, ROOFS, PLATE TURNABLES, &c.
S. J. FIELDS, ENGINEER. GEO. C. BELL, MANAGER.

Office and Works: Forest avenue, cor. Niagara street.

Patapsco Bridge and Iron Works.

WENDELL BOLLMAN, Proprietor.

The Only Establishment in Baltimore Manufacturing its own Bridges



Manufacture BOLLMAN'S PATENT SUSPENSION TRUSS and other forms of
iron and combination bridges, roofs, iron fronts and every description of cast and
wrought iron work for buildings and railroad construction.

Pneumatic Pile.—Having on hand all the necessary appliances for sinking the same, we would
call especial attention to our great facilities for executing this branch of work.

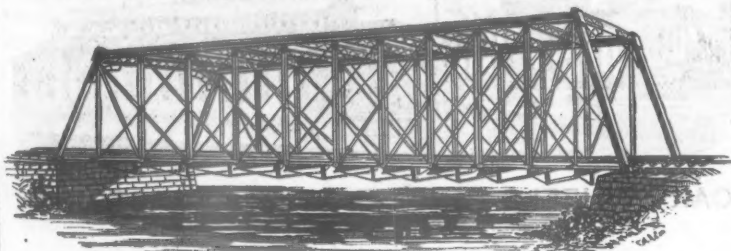
THIEMEYER'S PATENT SWITCHES.

Eight-Inch Cast Iron Revolving Station Water Columns, which will fill locomotive
tanks in about one minute, and such as used on the Baltimore & Ohio Railroad.

Marine Work in all its Branches.—The most approved designs and thorough execution
guaranteed in the construction of all classes of marine work.

Office, No. 8 South Gay street, Baltimore, Md.: Works, Canton, Baltimore.

WROUGHT-IRON BRIDGE CO.



D. HAMMOND, President.
WM. BRITTON, Secretary.

Office and Works,
CANTON, O.

JOB ABBOTT, } Engineers.
E. G. MORSE, }

Manufacturers and Builders of all Wrought-Iron Railway and Highway Truss, Arch and Swing
Bridges, Plate and Lattice Girders, Iron Roofs, Turn-Tables, Iron Piers and Trestles. Have over
TWENTY-FOUR MILES of their IRON BRIDGES now in use in twenty-four different States and
Canada. ILLUSTRATED ALBUM and estimates sent on application.

KELLOGG & MAURICE,

OFFICE AND WORKS: ATHENS, PA.

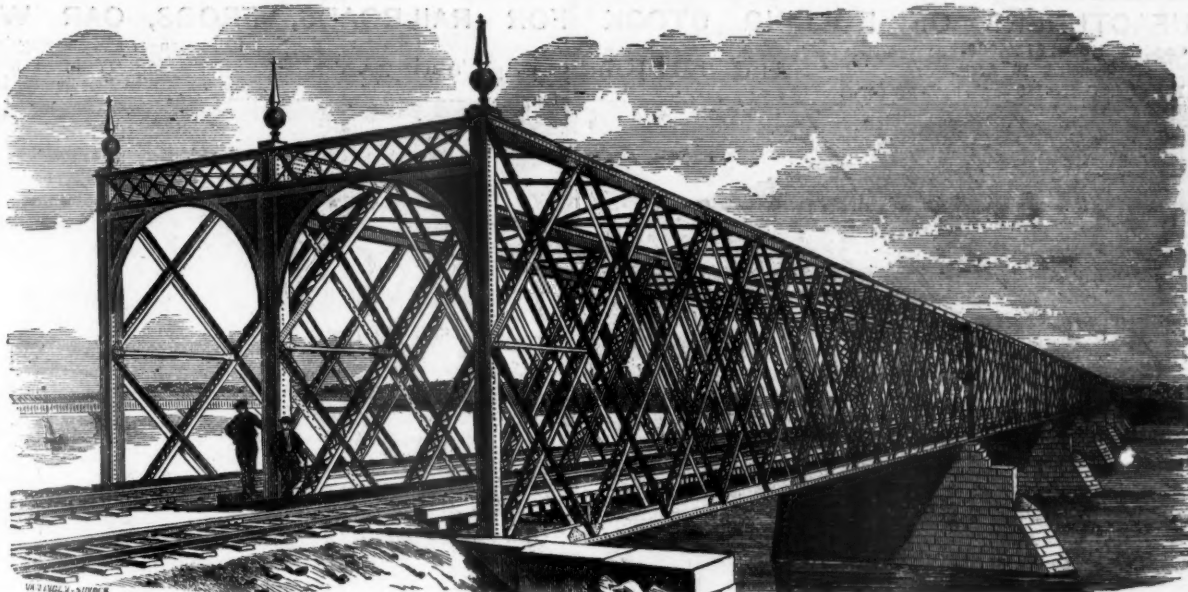


Iron and Wooden Bridges Roofs, Turn-tables, Etc.

Leighton Bridge & Iron Works,

ROCHESTER, N. Y.

Wrought-Iron Rivetted Lattice Railroad and Highway Bridges.



WROUGHT-IRON WATER PIPE AND GENERAL RIVETTED WORK.
ORDERS SOLICITED FROM CIVIL ENGINEERS AND CONTRACTORS.
[Accompanying engraving represents the Springfield Bridge, built by the Leighton Bridge & Iron Works.]

LOUISVILLE BRIDGE & IRON CO.,

Office and Works: Corner Oldham and 11th Streets, Louisville.



BUILDERS OF
FINK'S SUSPENSION AND TRIANGULAR TRUSSES,
and other forms of Iron and Combination Bridges. Also Manufacturers of Iron Roofs, Turn-tables,
Frogs, Switches, etc.
ALBERT FINK, President.
A. F. CHROCAN, Secretary.
F. W. VAUGHAN,
GILMAN TRAFTON, } Engineers.
E. BENJAMIN, Superintendent of Works.

J. H. COFRODE.

J. H. SCHAEFFER.

F. H. SAYLOR.

J. H. COFRODE & CO.,
Engineers and Bridge Builders.

DESIGN AND CONSTRUCT IRON, WOODEN AND COMBINATION BRIDGE
AND ROOF TRUSSES, &c.,

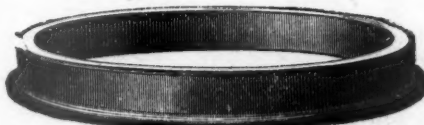
OFFICE:

No. 530 Walnut Street, Philadelphia.



CAMMELL'S CAST STEEL.

NEW YORK:
54 Cliff Street.



BOSTON:
109 North Street.

Rolled at Jersey City by W. Bailey Lang & Co.

THE STANDARD STEEL WORKS
Make a specialty of the manufacture of
CRUCIBLE CAST-STEEL TIRES,
OF STANDARD & BRAND.

The Ingots are cast solid and
thoroughly hammered and
worked before rolling. Over
8,000 of these tires are now
in use on various roads.



Their record justifies us in
recommending and guarantee-
ing them as equal to any in
use.

This company also manufac-
tures CRUCIBLE STEEL AX-
LES, FORGINGS, CASTINGS,
&c.

WORKS,

At Lewistown, Pa.

OFFICE,
215 S. FOURTH ST.,
Philadelphia.

MILWAUKEE IRON COMPANY,

MANUFACTURERS OF

RAILROAD IRON,

From 30 to 65 Lbs. Per Yard.

Re-Rolling Done on Short Notice.

PIG IRON.



BEST NO 1 FOUNDRY IRON constantly on hand and for sale in car-load or larger lots, at
lowest market price.

MERCHANT BAR IRON.

A FULL ASSORTMENT—SUPERIOR QUALITY.

Address all correspondence to

MILWAUKEE IRON CO.,
Milwaukee, Wis.

THE EDGAR THOMSON STEEL CO.,
LIMITED,
MANUFACTURERS OF



General Office and Works at Bessemer Station (Penn. R.R.), Alle-
gheny County, Pa.

New York Office, No. 57 Broadway.

The members of the Edgar Thomson Steel Company, Limited, have had large experience in manu-
facturing and in railway management; their works are the most complete in the world, with all the late
improvements, and are located in the best Bessemer metal district in the United States, and their man-
aging officers are experienced in the manufacture of Bessemer Steel.
The Company warrants its rails equal in quality to any manufactured in the United States.
Rails of any weight or section furnished on short notice. Orders for trial lots solicited.

Branch Office and P. O. Address,
D. McCANDLESS,
Chairman.



No. 41 Fifth Ave., Pittsburgh, Pa.
WM. P. SHINN,
General Manager.

New York, 30 Gold st.

Boston, 7 Hamilton st.

Chicago, 146 E. Lake st.

HUSSEY, WELLS & CO.,

Manufacturers of all descriptions of

CAST STEEL.

OFFICE AND WORKS:

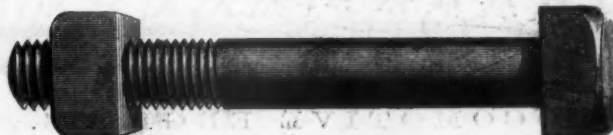
Penn Avenue and Seventeenth Street, Pittsburgh

C. A. HOTCHKISS.

PHILIP GAYLORD.

HOTCHKISS & GAYLORD,

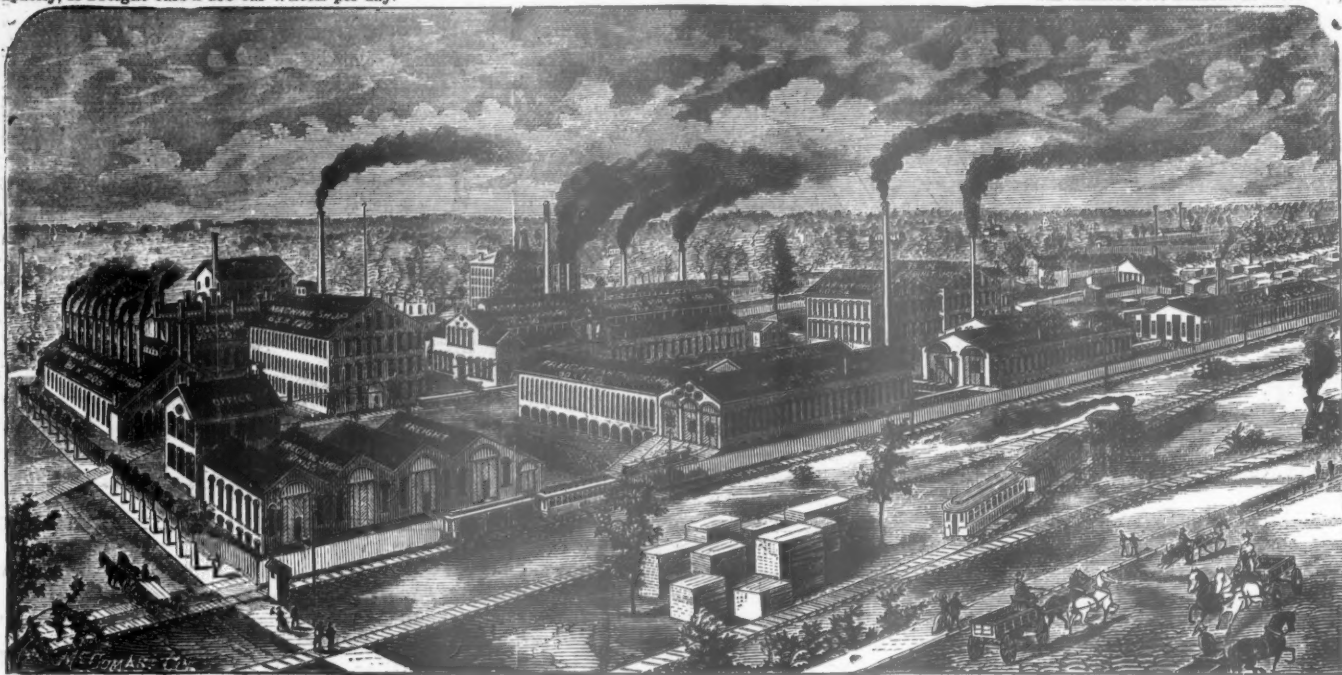
MANUFACTURERS OF



Machine Bridge and Railroad Bolts, Coach Screws
Bolt Ends, Track Bolts, &c.
CLEVELAND, OHIO.

MANUFACTURERS OF ROLLING STOCK FOR RAILROADS, FROGS, CAR WHEELS,
 Capital Stock, \$750,000.
 Grounds Occupied, 18 Acres.
 Capacity, 15 Freight Cars & 160 Car Wheels per day.
 And all Kinds of Castings.
 10 Passenger and Baggage per Month.
 EMPLOY 1,000 MEN.
 Six Million Feet Lumber in Store.

SPECIAL ATTENTION GIVEN TO NARROW GAUGE WORK



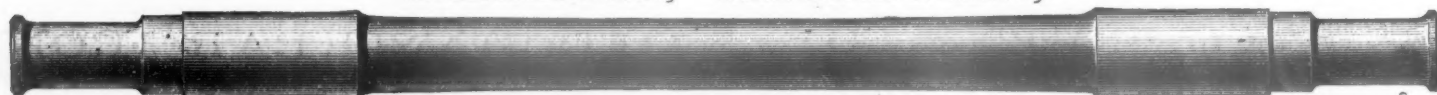
PHOTOGRAPHS OF WORK SENT ON APPLICATION.

E. E. BARNEY, Pres't.
 PRESERVED SMITH,
 Vice-Pres't and Treas.

ESTABLISHED 1849.
BARNEY & SMITH M'FG CO.,
 DAYTON, OHIO.

E. J. BARNEY, Sup
 J. D. PLATT, Sec'y,
 F. E. SMITH, Ass't Sec'y.

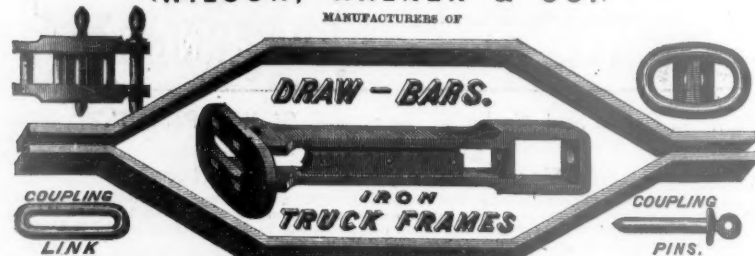
JOHN B. BAUGH'S STEAM FORGE,
 DETROIT, MICHIGAN,



MAKE A SPECIALTY OF
Car Axles, Links and Pins.
 ALSO MANUFACTURE SHAFTING, CRANKS, CONNECTING-RODS, LOCOMOTIVE FRAMES AND
 AXLES, AND HEAVY FORGINGS OF EVERY DESCRIPTION.

UNION FORGE AND IRON MILLS,
 (WILSON, WALKER & CO.)

MANUFACTURERS OF



Equalizing Bars for Car Trucks, "Miller Hooks" and Buffers.



UNIVERSAL PLATES FOR GIRDERS, BRIDGES, &c.

Works, corner Twenty-ninth and Railroad Streets, Pittsburg. Pa.

BALDWIN LOCOMOTIVE WORKS.

BURNHAM, PARRY, WILLIAMS & CO., Philadelphia,
LOCOMOTIVE ENGINES.

Especially Adapted to Every Variety of Railroad Service, including

Mining Engines and Locomotives for Narrow-Gauge Railways

All work accurately fitted to gauges, and thoroughly interchangeable. Plan, Materials, Work-
 manship, Finish and Efficiency fully guaranteed.

GEO. BURNHAM.
 EDWARD H. WILLIAMS.

CHAS. T. PARRY.
 EDW. LONGSTRETH.

WM. P. HENSZEY.
 JOHN H. CONVERSE.



MORRIS TASKER & COMPANY
 PASCAL IRON WORKS, PHILADELPHIA,
 TASKER IRON WORKS. NEWCASTLE. DEL.
 MANUFACTURERS OF

Lap-Welded American Charcoal Iron Boiler Tubes.

Wrought-Iron Tubes and Fittings of Every Description,
FOR GAS, STEAM, WATER AND OIL.

Steam and Gas Fitters Supplies, Machinery for Coal Gas Works, etc., etc.

Sole Manufacturers of

Vulcanized Rubber-Coated Iron Tubes,

A substitute for lead and galvanized iron tubes for the conveyance of water.

Office and Warehouse, No. 15 Gold St., New York.

OFFICE AND WAREHOUSE, No. 36 OLIVER ST., BOSTON.



TERMS OF SUBSCRIPTION:

Single copy, per annum, postage paid....\$4 20
Ten copies, per annum, postage paid.... 3 70 each.
Twenty-five copies, per annum, postage paid.... 3 50 each.
We prepay all postage (which subscribers have heretofore paid at their own offices).

ADVERTISEMENTS, to secure insertion must be delivered at the Publication Office as early as TUESDAY of the current week. Address THE RAILROAD GAZETTE, 73 Broadway, New York.

EMPLOYMENT.

[Advertisements of situations wanted or of officers or employes wanted will be inserted under this heading for TWO CENTS PER WORD for the first publication and ONE CENT PER WORD for each subsequent insertion. Payment must be made in advance. Letters forwarded.]

CIVIL ENGINEER DESIRES A RE-ENGAGEMENT. Has had a profitable training for the past 11 years in location, construction and maintenance of way of railroads. References given when required. Address "G. O.," Railroad Gazette Office, New York.

MECHANICAL ENGINEER WANTS A situation as draughtsman or a position of any kind where mechanical knowledge is required. Best references given. Address, CHAS. ROHN, Edge Moor Iron Works, Wilmington, Delaware.

AN ENGINEER WITH EXPERIENCE on Preliminary, Location and Construction, from Flagman to Chief Engineer; on standard and narrow gauges, having completed a road, is open for re-engagement in any capacity. Unexceptionable references. Address "A. W.," Railroad Gazette Office.

CIVIL ENGINEER AND DRAUGHTS man of seven years' experience, desires work in the line of his profession. References from former employers. Address "J. G.," Railroad Gazette Office.

DESIGNS AND DRAWINGS OF MA-chinery, &c., executed with accuracy and dispatch by THOS. KRAJEWSKI, office of the Railroad Gazette, 73 Broadway, New York. Being a thoroughly practical draughtsman, parties may rely upon having designs efficiently worked out so as to make the cost of construction as low as possible.

WANTED AND FOR SALE.

[Lists of machinery or supplies ready for delivery and announcements of wants will be inserted under this heading at THREE CENTS PER WORD, PER WEEK, OR TEN CENTS PER WORD FOR FOUR WEEKS. Payment must be made in advance.]

FOR SALE--
TESTING MACHINE, built by the South Boston Iron Company, arranged for tensile and compressive strains; capacity, 150 tons.
MILLING MACHINE, built by Brainard Milling Machine Company, cutters swing 28 inches diameter, and spindles set at right angles, which insures accurate work.
IRON ROOF, that covered New England Iron Company's mill, 8 arches, 80 feet span, posts 18 feet high, building now 30 feet wide by 90 feet long.
ROLLING TABLE for straightening iron.
PUDDLE TRAIN for billets and 3, 4 and 6 inch bars.
FIVE DRILLS.
CORRUGATING MACHINE, COMPLETE. Corrugated Sheet Iron and barbed nails.
Small upright engines, 15 H. P., 8-inch cylinder; pumps, etc. Apply to WM. E. COFFIN & CO., No. 8 Oliver street, Boston.

FOR SALE,

TWO SLEEPING CARS, In good order, fully equipped with bedding and other materials, ready for immediate use. Cars of same style as now used on N. Y. C. & H. R. For further particulars apply to

C. W. ROGERS,
Purchasing Agent, A. & P. R. R., St. Louis, Mo.

OFFICE OF THE

ILLINOIS CENTRAL R.R. CO.,

New York, Dec. 15, 1875.

A DIVIDEND OF FOUR PER CENT. has been declared by this Company, payable on the FIRST DAY of FEBRUARY NEXT to the holders of full paid shares registered at the close of the fifteenth day of January next, after which and until the fifth day of February the Transfer Books will be closed.

L. V. F. RANDOLPH, Treasurer.

NEW YORK CENTRAL

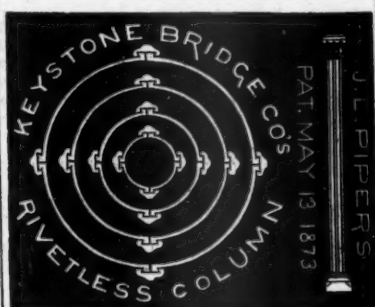
AND HUDSON RIVER RAILROAD COMPANY.

GRAND CENTRAL DEPOT, New York, Dec. 15, 1875. This Company is now prepared to make its annual contracts for CROSS TIES, to be delivered during the season of 1876. Proposals will be received until Jan. 1, 1876, for the delivery of Hewn White Oak Cross Ties only in lots of from 1,000 to 50,000 and upward, at points on the line between New York and Buffalo and Suspension Bridge. The Company reserve the right to reject any or all bids. Specifications and blank forms of proposals may be had on application to Mr. John C. Champion, Tie Agent, N. Y. C. & H. R. R. Co., Rome, N. Y.

WM. H. VANDERBILT, Vice-President.

ENGLISH VS. AMERICAN
BRIDGES.

A pamphlet of 32 pages. Send 25 cents to the RAILROAD GAZETTE, 73 Broadway, New York.



Prices as low as for Riveted Columns.
For lithographs, rates, etc., address
KEYSTONE BRIDGE COMP'Y,
Pittsburgh, Pa.

Or J. H. LINVILLE, President
218 South Fourth st., Philadelphia.

RICHARD DUDGEON,
24 COLUMBIA ST., NEW YORK.



**MAKER AND PATENTEE
OF IMPROVED
HYDRAULIC JACKS.**

Punches,
Roller - Tube
Expanders, &
Direct-Acting

STEAM HAMMERS.
Communications by letter will
receive prompt attention.

**JACKS FOR PRESSING ON CAR-WHEELS
OR CRANK PINS MADE TO ORDER.**

HOT JOURNALS ENTIRELY PREVENTED.

BY THE USE OF
**ALBERT BRIDGES
PATENT LUBRICANT.**



FOR RAILROAD CAR JOURNALS AND OTHER BEARINGS.

In presenting this Lubricant to the notice of Railroad and Steamboat managers and operators in machinery generally, I do so with a practical knowledge of its merits and with confidence that it will be found to possess invaluable qualities as a LUBRICATOR and COUNTERACTOR OF FRICTION. has been in use during the past two years on a number of Railroads and Steamers, and is highly approved of.

The LUBRICANT is a fine white powder, made from a mineral of talcous magnesian character, free from grit, and is ground and bolted especially for this purpose.

Parties wishing to make a practical test of the Lubricant will be furnished with sample on application.

ALBERT BRIDGES, PATENTEE.

Manufacturer and Dealer in

Railway Supplies and Machinery,
No. 46 CORTLANDT STREET, NEW YORK.

Established 1858.



The best and cheapest Paint in the world for Iron, Tin or Wood. For sale by the Trade everywhere. PRINCE'S METALLIC PAINT CO., Manufacturers, 96 Cedar St., New York.

CAUTION.—Purchasers and consumers are cautioned against imitations of our METALLIC PAINT. All genuine PRINCE'S METALLIC PAINT will bear our name and trade mark on each and every package. Send for a circular.



Contains in its construction four valuable patented improvements that make it MORE DURABLE than any other piano. The sales of these pianos have increased over six hundred per cent. in the past three years. The Arion Pianos are used exclusively by the New York Conservatory of Music because of their unequalled tone and great durability. Great inducements to Cash Purchasers. Write for Illustrated Circular, and mention where you saw this notice. Address

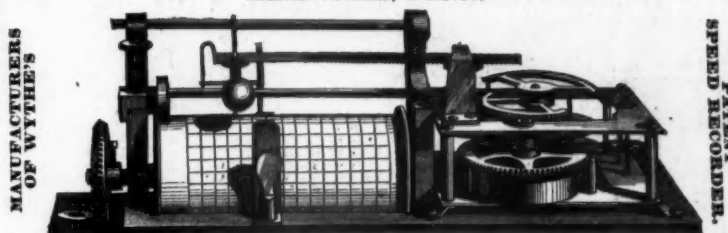
ARION PIANO-FORTE CO.,
No. 5 East Fourteenth st., N. Y.

PITTSBURGH CAR WHEEL WORKS,

JOHN L. GILL, Jr., Proprietor. Office: 83 Wood street, Pittsburgh, Pa.



Manufacturer of Wheels for Palace and Passenger Coaches, Locomotive Trucks and Tenders, and Freight Cars, and dealer in the best quality of Hammered Axes. Wheels bored and fitted to axes. Using only the best grades of Cold Blast Charcoal Pig Iron, we cannot compete in price with other manufacturers who use Hot Blast, or Anthracite Iron; but do claim with JOHN L. GILL, of Columbus, Ohio, to furnish as strong a wheel as can be produced, and one that will outlast the best that can be made of Hot Blast, or Anthracite Iron, and, therefore, proves to be the cheapest Wheel in use.

THE RAILWAY SPEED RECORDER COMPANY,
MEADVILLE, PENN.

A perfect indicator and recorder of the speed of trains, their stops and delays (necessary or unnecessary); a check on fast running. Great saving in wear of track and rolling stock; chances for accident reduced to a minimum. No experiment. In successful use on the Atlantic & Great Western, Chenango & Allegheny, and other railroads, to the officers of which we respectfully refer. Address, for circular and further information, the company as above, or J. B. MILLER, Supt., Kent, O.

CAYUTA WHEEL & FOUNDRY CO.,
WAVERLY, N. Y.

MANUFACTURERS

Wheels for Locomotives
TENDERS PASSENGER FREIGHT

AND
COAL CARS;

ALSO
CASTINGS OF EVERY DESCRIPTION.

REGINALD CANNING, Supt.,



GEORGE DOUGLASS,

MANUFACTURER OF

**LOCOMOTIVE ENGINE AND
CAR SPRINGS,**

MILLER DRAW HOOKS,

And All Kinds of Railroad Work
Done to order and warranted to give satisfaction.
No. 19 Water Street, Bridgeport, Conn.

MORGAN'S PATENT

DOUBLE ROTATING DROP PIPE,



GEO. C. MORGAN

Sole Manufacturer,

Room 16, Major Block,

S. E. cor. La Salle

and Madison streets,

Chicago, Ill.

THE CATECHISM OF

THE LOCOMOTIVE,

By M. N. FORNEY,

Mechanical Engineer.

Is an elementary treatise on the Locomotive, written in the form of questions and answers. The book contains 609 pages and 250 engravings, including 16 full-page plates of different styles of locomotives.

The principles of operating and details of construction are so clearly explained as to enable any intelligent person to thoroughly understand them. The book is written without the use of technical terms or abstruse mathematical calculations, and is intended for all classes of readers.

No popular treatise on the locomotive in the English language gives so clear, simple and complete a description of the construction and working of the locomotive engine, and no work of any kind, however extensive, gives so full an account of modern American practice in locomotive construction, and of the latest scientific discoveries which have application to the operation of the locomotive, especially those relating to combustion, heat, etc., all of which the author has endeavored to make plain to those who have not even the rudiments of a scientific education.

Price \$2.50. Address The Railroad Gazette, 73 Broadway, New York.

ROADMASTER'S ASSISTANT

AND

SECTION MASTER'S GUIDE,

BY WM. S. HUNTINGTON,

Is the most complete and compact hand book ever published on this subject. It contains the results of more than 25 years' experience as roadmaster; is written in a clear and attractive style; gives minute directions for laying, repairing and ballasting track, building cattle-guards, culverts, turn-outs, etc., and discusses all parts of the road and station master's work—pointing out the right and wrong methods. Price, \$1.00. Address The Railroad Gazette, 73 Broadway, New York.

Patten Car Works, BATH, MAINE.

G. F. PATTEN'S SONS,

MANUFACTURERS OF

PASSENGER, MAIL, BAGGAGE AND FREIGHT CARS OF
EVERY DESCRIPTION.

JAS. T. PATTEN.

GEO. M. PATTEN.

W. C. ALLISON & SONS,

MANUFACTURERS OF

RAILROAD CARS,

FORGINGS, CASTINGS, BOLTS, NUTS, WASHERS, &c.

For Cars, Buildings and Bridges,
ALSO

LAP-WELDED WROUGHT IRON TUBING.

Locomotive Boiler Tubes a Specialty.

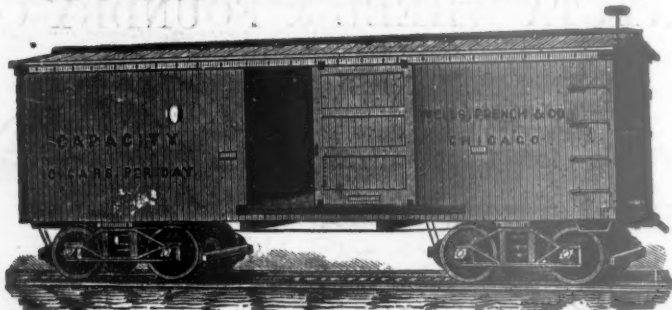
Made of Charcoal Iron or Steel.

Main Office and Works:

Branch Office and Warehouse:

32d and Walnut Sts., Philadelphia. | No. 78 John Street, New York.

WELLS, FRENCH & CO.,



BRIDGE AND CAR BUILDERS.

Railroad and Highway Bridges, Roofs, Turn-Tables and Draw-Bridges. Bolts and Dimension Timber to order. Specifications and estimates furnished 146 DEARBORN ST., Chicago.

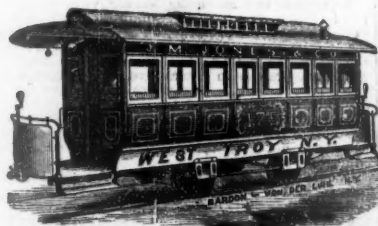


PASSENGER CARS,

Of the Finest Finish, as well as Every Description of CAR WORK, furnished at Short Notice and at Reasonable Prices by the

HARLAN & HOLLINGSWORTH COMPANY, Wilmington, Del.

J. M. JONES & CO.,



Manufacturers of

STREET CARS (exclusively),

Embracing every variety of close and open cars, for either one or two sides.

West Troy, N. Y.

DEAD-STROKE POWER HAMMERS,

Improved Hydraulic Jacks,

Manufactured by

PHILIP S. JUSTICE,

PHILADELPHIA.

PHILADELPHIA CAR WORKS.



J. G. BRILL & CO.,

Manufacturers of cars of every description. Street Cars of the most approved styles. Narrow Gauge Passenger and Freight Cars.

Thirty-first and Chestnut Streets,
PHILADELPHIA.

32- Cars built in sections for shipment

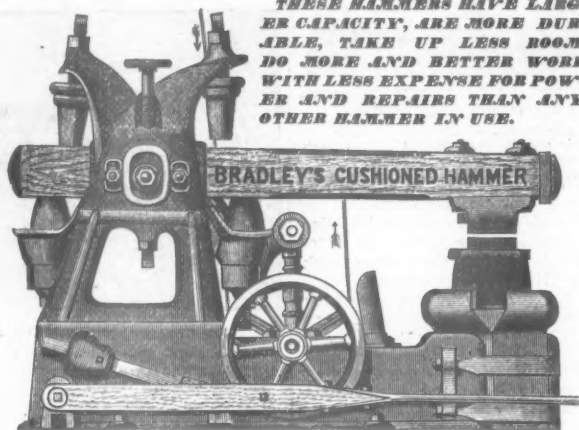
"DEAD STROKE" POWER HAMMER.

IMPROVED ADJUSTABLE CRANK PIN.

Strikes Blow Heavy or Light, Fast or Slow.

Prices Reduced Jan. 1st, 1875.

The Hull & Belden Company, Danbury, Ct.



THESE HAMMERS HAVE LARGE
CAPACITY, ARE MORE DUR-
ABLE, TAKE UP LESS ROOM,
DO MORE AND BETTER WORK
WITH LESS EXPENSE FOR POW-
ER AND REPAIRS THAN ANY
OTHER HAMMER IN USE.

This Hammer has many valuable improvements made useful in the device for cushioning the blow, thereby relieving all the working parts from that jar and concussion which is the destroying element of other helve hammers. It is made

Adjustable in Line of Action, Length of Stroke, Rapidity of Motion, and Weight of Blow,

all of which are controlled at the will of the operator. They have

Larger capacity, cost less, are more durable, take up less room, do more and better

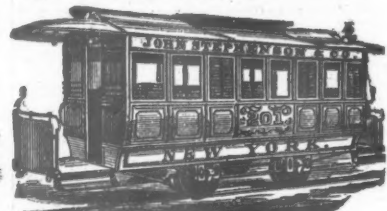
work at less expense for power than any other Hammer in use.

We guarantee them fully as recommended. For particulars, address

BRADLEY MANUFACTURING CO., Syracuse, N. Y.

Cars, Light, Strong and Elegant.

ORDERS PROMPTLY FILLED.

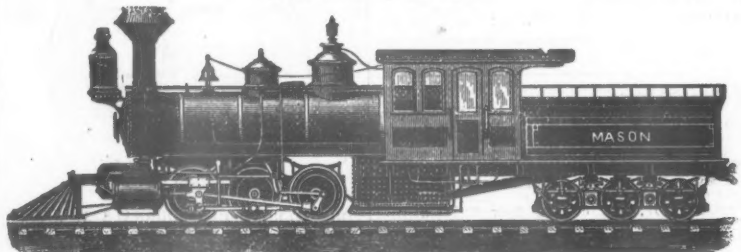


OMNIBUSES OF EVERY STYLE.

No. 47 EAST TWENTY-SEVENTH STREET, NEW YORK.

MASON MACHINE WORKS,

TAUNTON, MASS.



WM. MASON, Pres't.

WM. H. BENT, Treas.

FRED'K MASON, Agent.

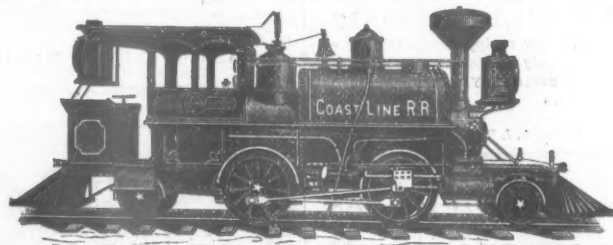
BUILDERS OF ALL KINDS OF

LOCOMOTIVES,

INCLUDING DOUBLE-TRUCK LOCOMOTIVES FOR WIDE OR NARROW-GAUGE RAILROADS.

ALSO ALL KINDS OF COTTON MACHINERY

PORTER, BELL & CO.



EXCLUSIVE
SPECIALTY

LIGHT LOCOMOTIVES,

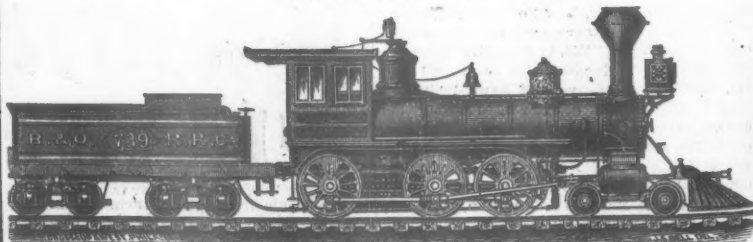
For Mines, Furnaces, Contractors' Use, and other Special Service; also Light and Heavy Styles of Narrow Gauge Passenger and Freight.

Office, No. 5 Monongahela House,
Works, A. V. R. R. and 50th St.,

PITTSBURGH, PENN.

PITTSBURGH LOCOMOTIVE & CAR WORKS,

PITTSBURGH, PA.



MANUFACTURERS OF

LOCOMOTIVE ENGINES FOR BROAD OR NARROW GAUGE ROADS,

From standard designs, or according to specifications, to suit purchasers.

Tanks, Locomotive or Stationary Boilers furnished at Short Notice.

D. A. STE

Pres't.

J. A. DURGIN, Sup't.

WILSON MILLER, Sec. and Treas.

RHODE ISLAND LOCOMOTIVE WORKS,

PROVIDENCE, RHODE ISLAND.

WILLIAM CORLISS

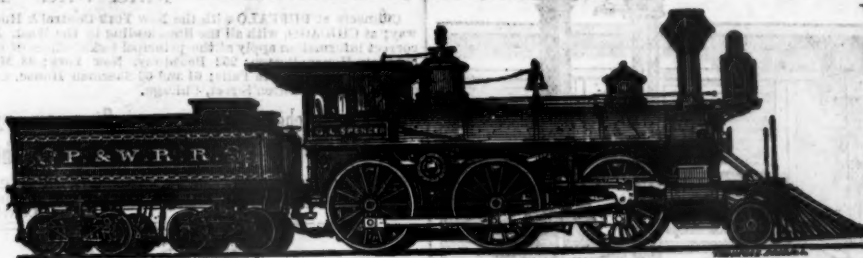
Treasurer.

W. S. SLATER,

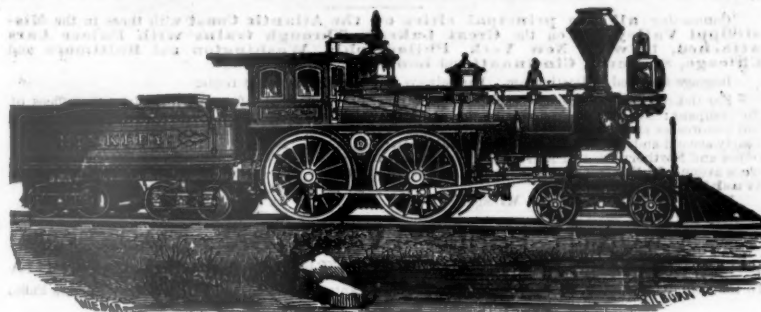
President.

W. H. FENNER, Jr.,

Secretary.



HINKLEY LOCOMOTIVE WORKS,



439 ALBANY STREET, BOSTON.

MANUFACTURE

LOCOMOTIVE ENGINES AND TENDERS,
BOILERS AND TANKS,

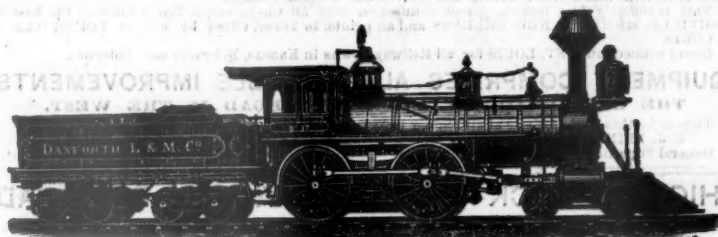
Gun Metal and Common Iron Castings, Brass and Composition Castings.

LOCOMOTIVES AND BOILERS REPAIRED.

Sole manufacturers of the "HINKLEY PATENT BOILER." All orders will be executed with dispatch.

ADAMS AYER, Pres't. F. L. BULLARD, Treas. FRANK D. OHILD, Sup't.
GEO. F. OHILD, Secretary. H. L. LEACH, General Manager.

DANFORTH LOCOMOTIVE AND MACHINE CO.

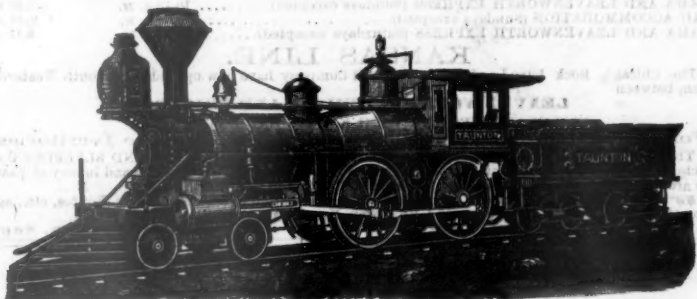


JOHN COOKE, President.
J. T. BLAUVELT, Vice-President.
WM. BERDAN, Sec'y & Treasurer.
JAMES COOKE, Superintendent.

PATERSON, N. J.

New York Office, 52 Wall St.
H. A. ALLEN, AGENT.

Taunton Locomotive Manufacturing Co.,



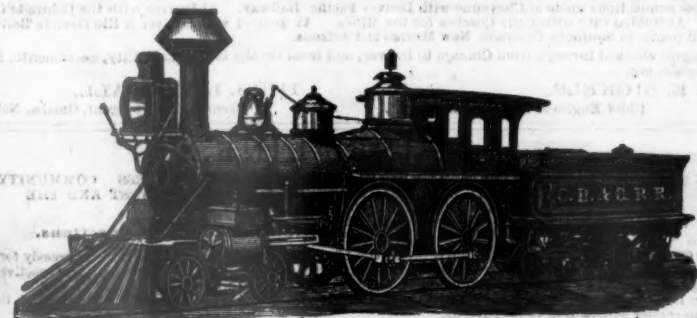
P. I. FERRIN, Supt.

[ESTABLISHED IN 1846.]

HARRISON TWEED, Treas.

TAUNTON, MASS.

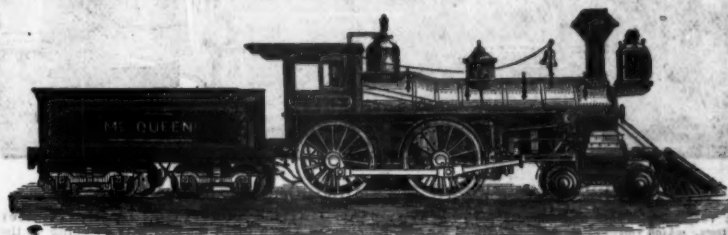
Manchester Locomotive Works,



MANUFACTURERS OF LOCOMOTIVE ENGINES.

All work accurately fitted to gauges. All parts duplicated and guaranteed of best material and workmanship.
JOHN A. BURNHAM, President.
W. G. BEANS, Treas., Boston, Mass.

Schenectady Locomotive Works,

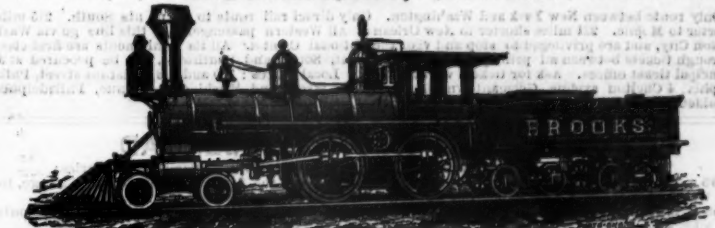


SCHENECTADY, N. Y.

JOHN C. ELLIS, Pres. CHAS. G. ELLIS, Treas. WALTER McQUEEN, Supt.

BROOKS LOCOMOTIVE WORKS,

DUNKIRK, N. Y.

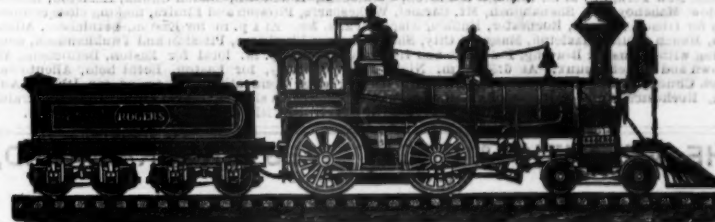


Orders Solicited for Locomotives Adapted for Every Class of Railway Service.

M. L. HINMAN, Sec'y & Treas. H. G. BROOKS, Pres't & Supt.

ROGERS LOCOMOTIVE AND MACHINE WORKS

Paterson, New Jersey.



Having extensive facilities, are now prepared to furnish promptly, of the best and most approved description, either COAL OR WOOD BURNING

Locomotive Engines, and other Varieties of Railroad Machinery.

J. S. ROGERS, President.
H. S. HUGHES, Secretary.
WM. S. HUDSON, Supt.

PATERSON, N. J.

THOS. ROGERS, Treas.
44 Exchange Place, New York.

NATIONAL LOCOMOTIVE WORKS,

W. H. BAILY & CO.,

MANUFACTURERS OF

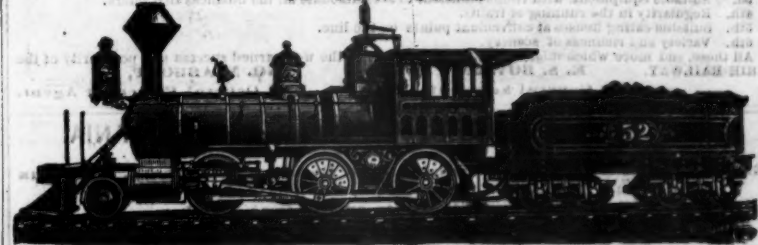
LOCOMOTIVES.

LIGHT AND NARROW-GAUGE LOCOMOTIVES A SPECIALTY.

ALL MATERIAL AND WORKMANSHIP GUARANTEED TO BE OF THE VERY BEST.
OFFICE AND WORKS AT CONNELLSVILLE, PENN.

LOCOMOTIVE ENGINE SAFETY TRUCK CO.

OF NEW YORK.



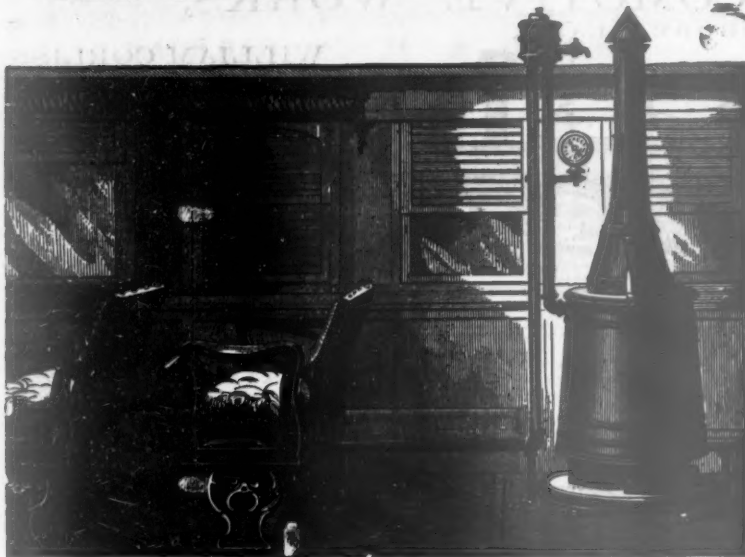
Proprietors of the following Letters Patent granted to Levi Disell, Aug. 4, 1867; Nov. 2, 1868 (extended Nov. 2, 1873); A. W. Smith, Feb. 11, 1862; D. E. Pratt, Oct. 16, 1860; W. S. Hudson, April 4, 1864, and May 10, 1864.

DRAWINGS FURNISHED AND LICENSES GRANTED ON APPLICATION.

A. F. SMITH, President.
ALBERT BRIDGES, Treas.

M. F. MOORE, Sec'y and Agent,
No. 46 Cortlandt st., N. Y.

WARMING AND VENTILATING RAILROAD CARS BY HOT WATER.



BAKER'S PATENT CAR WARMER.—One way of Applying it.

A very simple, safe and efficient plan for Warming Railway Carriages by Hot Water Pipes, which radiates the heat directly at the feet of each passenger, without the necessity of going to the stove to be warmed. All the finest Drawing-Room and Sleeping Cars in the United States have it, or are adopting it.

Full descriptive pamphlets furnished on application.

BAKER, SMITH & CO.,

Corner Greene and Houston Sts., N. Y., and 81 and 83 Jackson St., Chicago.

PHILADELPHIA, WILMINGTON & BALTIMORE R. R.

GEO. A. DAUMUN, General Ticket Agent, Philadelphia. H. F. KENNEY, Superintendent.

Only route between New York and Washington. Only direct rail route to all points South. 275 miles shorter to M. J. 221 miles shorter to New Orleans. All Western passengers by this line go via Washington City, and are privileged to stop and visit the National Capitol. All its equipments are first-class. Through tickets between all principal points East, West, South and Southwest, can be procured at all principal ticket offices. Ask for tickets via Baltimore. Local Offices: 799 and 838 Chestnut street, Philadelphia; 4 Chelton avenue, Germantown; Depot, Broad street and Washington avenue, Philadelphia; President Street Depot, and 143 West Baltimore street, Baltimore, Md.

BALTIMORE & OHIO RAILROAD.

Three Fast Express Trains leave New York via Desbrosses and Cortlandt street ferries: 8:35 a. m., daily, except Sundays, Washington, Lynchburg, and the Southwest, Cincinnati, Chicago, the West and Northwest, Louisville, New Orleans, &c. 8:55 p. m., daily, except Sundays, Washington, Richmond and the South, Pittsburgh, Cincinnati, Louisville, St. Louis, Chicago, the West and Northwest. 8:55 p. m., daily, Washington, Richmond and the South, Lynchburg and the Southwest, New Orleans, through sleepers Baltimore to New Orleans, Pittsburgh, Cincinnati, Louisville, Indianapolis, St. Louis, Chicago, the West and Northwest.

For through tickets and general information call at Company's offices, 361 and 315 Broadway, and at ticket offices foot of Desbrosses and Cortlandt streets. Ask for tickets via Baltimore & Ohio Railroad. Through cars, Jersey City to Washington. Through cars, Baltimore to Chicago, Cincinnati, &c.

LEHIGH VALLEY RAILROAD

ARRANGEMENT OF PASSENGER TRAINS, AUG. 8, 1875.—Leave depots foot of Courtlandt and Desbrosses streets, New York, at 7 a. m. through to Easton, Bethlehem, Allentown, Mauch Chunk, Hazleton, Beaver Meadow, Mahanoy City, Shenandoah, Mt. Carmel, Wilkesbarre, Pittston and Elmira, making close connections for Ithaca, Auburn, Rochester, Buffalo, Niagara Falls, &c. At 1 p. m. for Easton, Bethlehem, Allentown, Mauch Chunk, Hazleton, Mahanoy City, Shenandoah, Wilkesbarre, Pittston and Tunkhannock, connecting with trains for Reading, Pottsville and Harrisburg. At 4 p. m. local for Easton, Bethlehem, Allentown and Mauch Chunk. At 6:30 p. m. Night Express, daily, for Easton, Bethlehem, Allentown, Mauch Chunk, Wilkesbarre, Pittston and Elmira, making close connection with trains for Ithaca, Auburn, Rochester, Buffalo, Niagara Falls and the West. Pullman's sleeping coaches attached to this train. ROBERT H. SAYRE, Superintendent and Engineer.

THE ATLANTIC & GREAT WESTERN RAILROAD,

in connection with the

ERIE RAILWAY.

forms the Great Broad-Gauge Route to the WEST and SOUTH. For Chicago, Cleveland, Omaha and all points in the Northwest. For Cincinnati, Louisville, St. Louis, Kansas City and points in the Southwest.

THIS IS THE ONLY LINE, in connection with the Erie Railway, which runs through sleeping coaches from New York and local stations to Cleveland, Mansfield, Galena, Dayton and Cincinnati without change.

Special The Southern system of railways are now running palace sleeping coaches from Cincinnati (in direct connection with express trains on this line) to Memphis, Jackson and New Orleans; from Cincinnati to Nashville, Decatur, Montgomery, Mobile and New Orleans—making but one change from New York to any prominent point South—via this line.

For through tickets at lowest rates, palace coach locations, and further information concerning the route, please apply at ticket offices Erie Railway and at offices of connecting lines. Ask for tickets via the Atlantic and Great Western Railroad.

P. D. COOPER, Gen. Supt., CLEVELAND, O. W. B. SHATTUC, Gen. Passenger Agent, CINCINNATI, O.

ERIE RAILWAY.

BROAD GAUGE DOUBLE TRACK. The Short Line Between New York and Buffalo and Niagara Falls.

THREE THROUGH EXPRESS TRAINS EACH WAY DAILY. LUXURIOUS DRAWING-ROOM AND SLEEPING COACHES.

What Gives Popularity to a Railway.

- 1st. Good management; a strict regard to the comfort and safety of passengers.
- 2d. Low rates of fare, fostering and encouraging travel.
- 3d. Suitable equipment, with trains sufficient to accommodate all the business that offers.
- 4th. Regularity in the running of trains.
- 5th. Suitable eating houses at convenient points on the line.
- 6th. Variety and richness of scenery.

All these, and more which might be added, contribute to the well earned success and popularity of the ERIE RAILWAY. E. B. BOWEN, General Superintendent. J. N. ABBOTT, General Passenger Agent.

THE BEST ROUTE TO INTERIOR PENNSYLVANIA.

Express Trains daily from Philadelphia to Reading, Harrisburg, Tamaqua, Pottsville, Mahanoy City, Ashland, Shamokin, Danville, Williamsport, and all points on the Coal, Lumber and Ore Regions of the State.

EXPRESS TRAINS FROM ALLENTOWN FOR SAME POINTS IN CONNECTION WITH TRAINS OF CENTRAL RAILROAD OF NEW JERSEY FROM NEW YORK.

Purchase Tickets via Reading.

J. E. WOOTTEN, Gen. Supt., Reading. C. G. MARCOCK, Gen. Ticket Agent, Phila.

THE LAKE SHORE & MICHIGAN SOUTHERN R.Y. Chicago and Buffalo South Shore Line via Cleveland and Toledo.

Connects at BUFFALO with the New York Central & Hudson River Railroad, and with the Erie Railway; at CHICAGO, with all the lines leading to the West, Northwest and Southwest. For tickets and correct information apply at the principal ticket offices of connecting lines, and at the Company's Offices, old State House, Boston; 252 Broadway, New York; 85 Mill Street, Rochester, New York; No. 4, International Hotel, Niagara Falls; 64 and 66 Sherman House, Chicago; Rotunda, Palmer House, Chicago, and at Depot on Van Buren Street, Chicago.

Sleeping Coaches and Baggage Cars are run by this Line Between Chicago and New York Without Change.

JOHN A. BURCH, General Eastern Pass. Agent, Buffalo, N. Y.

CHAS. PAINE, General Superintendent, Cleveland, O.

F. E. MORSE, General Western Pass. Agent, Chicago, Ill.

PENNSYLVANIA RAILROAD.

GREAT TRUNK LINE AND UNITED STATES MAIL ROUTE. THE BEST CONSTRUCTED AND MOST COMPLETELY EQUIPPED RAILWAY IN AMERICA.

Connecting all the principal cities on the Atlantic Coast with those in the Mississippi Valley and on the Great Lakes. Through trains with Palace Cars attached, between New York, Philadelphia, Washington and Baltimore and Chicago, St. Louis, Cincinnati and Louisville.

Baggage Checked to Destination. Fare always as low as by any other route.

For tickets, palace and parlor car accommodations, and all desired information, apply at the offices of the Company: Nos. 203 and 205 Washington st., Boston; No. 1 Astor House, Nos. 522 and 944 Broadway, and Desbrosses and Cortlandt street ferries, New York; Nos. 838 and 1348 Chestnut street, and Depot, Thirty-second and Market streets, Philadelphia; N. E. cor. Baltimore and Calvert streets, Union Depot and Northern Central Railway Depot, Baltimore; N. E. corner Thirteenth street and Pennsylvania avenue, N. E. corner Sixth street and Pennsylvania avenue, and Baltimore and Potomac R. R. Depot, Washington City. FRANK THOMSON, General Manager. D. M. BOYD, Jr., General Passenger Agent.

NORTH PENNSYLVANIA RAILROAD.

THE SHORT AND FAVORITE ROUTE FROM PHILADELPHIA To the Lehigh, Wyoming and Susquehanna Valleys, Scranton, Elmira, Rochester, Buffalo, Niagara Falls, New York State, the West and Northwest.

FAST TIME, SURE CONNECTIONS, PARLOR AND SLEEPING CARS.

Philadelphia Passenger Depot, Berks and American Streets.

Daily Fast Freight Trains are run between Philadelphia and the above-named districts delivering freight with regularity and dispatch on terms as low as any other route.

PHILADELPHIA FREIGHT DEPOT, FRONT AND NOBLE STREETS.

ELLIS CLARK, Gen'l Agent, Front and Willow Streets, Philadelphia.

Philadelphia City Offices: Fifth and Chestnut sts. and 738 Chestnut st.

CLEVELAND, COLUMBUS, CINCINNATI & INDIANAPOLIS RAILWAY,

THE GREAT CENTRAL TRUNK ROUTE TO THE OHIO AND MISSISSIPPI RIVERS.

Evening trains leave CLEVELAND daily with Rotunda Sleeping Cars, for COLUMBUS, CINCINNATI, INDIANAPOLIS, LOUISVILLE, TERRE HAUTE, EVANSVILLE, ST. LOUIS and all points West and South.

Morning trains leave daily except Sunday, with through Palace Coaches, for COLUMBUS, CINCINNATI, INDIANAPOLIS, LOUISVILLE and ST. LOUIS without change.

This is the only line making direct connection with all the Principal Trunk Lines of the East for NASHVILLE, MEMPHIS, NEW ORLEANS and all points in Texas, either by way of LOUISVILLE or ST. LOUIS.

Direct connection at ST. LOUIS for all Railway Towns in Kansas, Nebraska and Colorado.

EQUIPMENT COMPRISES ALL VALUABLE IMPROVEMENTS.

THE BEST ROAD-BED AND SAFEST ROAD IN THE WEST.

Tickets by this route for sale at all regular ticket offices.

E. J. FLINT, General Superintendent.

S. F. PIERSON, General Ticket Agent.

CHICAGO, ROCK ISLAND & PACIFIC RAILROAD.

The direct route for Joliet, Morris, Ottawa, LaSalle, Peru, Henry, Peoria, Lacon, Geneseo, Moline, ROCK ISLAND, DAVENPORT, Muscatine, Washington, Iowa City, Grinnell, Newtowa, Des Moines, COUNCIL BLUFFS AND OMAHA.

Connecting with Trains on the Union Pacific Railroad for CHEYENNE, DENVER, CENTRAL CITY, OGDEN, SALT LAKE, WHITE PINE, HELENA, SACRAMENTO, SAN FRANCISCO, and Points in Upper and Lower California, and with Ocean Steamers at San Francisco, for all Points to China, Japan, Sandwich Islands, Oregon and Alaska.

DEPOT, HEAD OF LA SALLE STREET; TICKET OFFICE, PACIFIC HOTEL.

| | LEAVE | ARRIVE |
|---|-------------|------------|
| OMAHA AND LEAVENWORTH EXPRESS (Sundays excepted)..... | 10.15 A. M. | 2.30 P. M. |
| PERU ACCOMMODATION (Sundays excepted)..... | 5.00 P. M. | 9.30 A. M. |
| OMAHA AND LEAVENWORTH EXPRESS (Saturdays excepted)..... | 10.00 P. M. | 6.15 A. M. |

KANSAS LINE.

The Chicago, Rock Island and Pacific Railroad Company have now opened their South Western Division, between

LEAVENWORTH, ATCHISON AND CHICAGO.

CONNECTING WITH KANSAS RAILROADS.

For all points in Western Missouri, Colorado and the Territories. The Company have built a full complement of PALACE DRAWING ROOM AND SLEEPING CARS, which for external beauty and interior arrangements for the comfort, convenience and luxury of passengers are unequalled, if equaled, by any other cars of the kind in the world.

For Through Tickets, and all desired information in regard to Rates, Routes, etc., apply at the Company's Offices, Chicago, or 357 Broadway, New York. A. M. SMITH, Gen. Pass. Agent. HUGH RIDDLE, Gen. Supt.

UNION PACIFIC RAILROAD VIA OMAHA.

THE ONLY DIRECT ALL RAIL ROUTE; being 226 miles the Shortest Route Salt Lake, Sacramento, San Francisco, and the Mining Districts of Utah, Montana, Nevada, California, Etc., Etc.

Five Hours the Quickest Route to Denver.

Close connections made at Cheyenne with Denver Pacific Railway. At Denver with the Colorado Central. At Golden City with Daily Coaches for the Mines. At Denver with Denver & Rio Grande Railway for all points in Southern Colorado, New Mexico and Arizona.

Baggage checked through from Chicago to Denver, and from Omaha to Salt Lake City, Sacramento, San Francisco, etc.

T. E. SICKELS, Chief Engineer and Superintendent.

THOS. L. KIMBALL, General Ticket Agent, Omaha, Neb.

EMPIRE LINE.

THE EMPIRE TRANSPORTATION COMPANY OFFERS TO THE BUSINESS COMMUNITY A RELIABLE FAST FREIGHT LINE BETWEEN THE EAST AND THE WEST AND THE GREAT OIL REGION OF PENNSYLVANIA.

Via the Philadelphia & Erie Railroad and its Connections.

IT OWNS AND CONTROLS ALL THE CARS OF ITS LINE, which are new and built expressly for its trade, and furnished with BROAD TREAD WHEELS, which enable it to run through irrespective of change of gauge, thus avoiding the injurious delays prevalent at transshipping points. The Line is managed by men of long experience in the business, and no effort will be spared on their part to render satisfaction to its patrons.

Parties ordering goods from the East will please direct shippers to mark packages "EMPIRE LINE," and refer them to the agents of the company for shipping directions, etc., &c.

GEO. W. BISTINE, Western Supt., Cleveland, Ohio.

W. F. GRIFFITH, Jr., General Freight Agent, Philadelphia, Pa.

GEORGE M. BALL, Eastern Supt., Williamsport, Pa.

THE FAVORITE ROUTE—EAST OR WEST.

MICHIGAN CENTRAL RAILROAD,
AN IMPORTANT LINK IN THE
GREAT CENTRAL ROUTE
Between the East and West.

THREE EXPRESS TRAINS EACH WAY DAILY, MAGNIFICENTLY EQUIPPED WITH NEW DAY COACHES

AND
WAGNER SLEEPING AND PARLOR CARS.
THROUGH CARS FROM AND TO

CHICAGO, NEW YORK AND BOSTON.

H. B. LEDYARD, Asst. Gen'l Sup't, Detroit. | W. M. B. STRONG, Gen'l Sup't, Chicago.
HENRY C. WENTWORTH, Gen'l Pass. and Tkt. Agent, Chicago.

THE FAVORITE THROUGH PASSENGER ROUTE. CHICAGO, BURLINGTON & QUINCY RAILROAD LINE.

THREE THROUGH EXPRESS TRAINS DAILY.

| FROM CHICAGO | Hours. | 1st Class Fare. | FROM CHICAGO | Days. | 1st Class Fare. |
|-----------------|--------|-----------------|-------------------|-------|-----------------|
| TO OMAHA, | 9 30 | \$16.00 | TO DENVER, | 3 30 | \$27.00 |
| TO ST. JOSEPH, | 9 30 | 17.30 | TO SACRAMENTO, | 4 30 | 116.00 |
| TO KANSAS CITY, | 9 30 | 17.30 | TO SAN FRANCISCO, | 5 30 | 116.00 |

Trains leave Chicago from the Great Central Depot, foot of Lake street, stopping at Indiana avenue and Canal street stations, as follows:

BURLINGTON, KEOKUK, COUNCIL BLUFFS & OMAHA LINE.

7:30 A. M. MAIL AND EXPRESS (except Sunday), stopping at all stations; making close connections at Mendota with Illinois Central for Amboy, Dixon, Freeport, Galena, Dunleith, Dubuque, La Salle, El Paso, Bloomington, etc.
10:00 A. M. PACIFIC FAST LINE (except Sundays), stopping at Aurora, Mendota, Princeton, Buda, Galva, Galesburg, and all stations west and south of Galesburg.
ELEGANT DAY COACHES and Pullman Palace Drawing-Room Cars are attached to this train daily from

CHICAGO TO COUNCIL BLUFFS AND OMAHA WITHOUT CHANGE.

10:00 P. M. PACIFIC NIGHT EXPRESS (Daily, except Saturday), for Burlington, Ottumwa, Des Moines, Nebraska City, Council Bluffs, Omaha and all points west. Pullman Drawing-Room Sleeping Car attached to this train daily from Chicago to Burlington, and Elegant Day Coaches, from Chicago to Council Bluffs and Omaha without change! This is the Route between CHICAGO, COUNCIL BLUFFS AND OMAHA running the celebrated Pullman Palace Dining Cars.

THE SHORTEST, BEST AND QUICKEST

ROUTE BETWEEN CHICAGO AND KEOKUK,

Crossing the Mississippi River on the Great Iron Bridge at Burlington!

QUINCY, ST. JOSEPH, LEAVENWORTH AND KANSAS CITY LINE.

7:30 A. M. MAIL AND EXPRESS (except Sunday), stopping at all stations; making close connections at Mendota with Illinois Central for Amboy, Dixon, Freeport, Galena, Dunleith, Dubuque, La Salle, El Paso, Bloomington.

10:00 A. M. PACIFIC FAST LINE (Daily, except Sunday), with ELEGANT DAY COACHES and PULLMAN'S PALACE SLEEPING CARS attached, running through from Chicago to KANSAS CITY, without change.

10:00 P. M. PACIFIC NIGHT EXPRESS (Daily, except Saturday), with Pullman Palace Drawing-Room Sleeping Car attached, running through from Chicago to Quincy and Kansas City without change!
THIS IS THE SHORTEST, BEST AND ONLY ROUTE BETWEEN CHICAGO AND KANSAS CITY WITHOUT CHANGE OF CARS OR FERRY.

The Shortest, Best and Quickest Route between Chicago and St. Joseph, Atchison, Weston, Leavenworth, Lawrence, and all points on the Kansas Pacific Railway.

LOCAL TRAINS LEAVE CHICAGO FOR

Riverside, Hinsdale and Downer's Grove.....11:00 A. M., 1:45 and 6:15 P. M.
Mendota and Ottawa Passenger.....11:00 A. M., 1:45 and 6:15 P. M.
Aurora Passenger.....11:00 P. M. (Sunday only), 3:15 and 5:30 P. M.
ASK FOR TICKETS via Chicago, Burlington & Quincy Railroad, which can be obtained at all the principal offices of connecting roads, and at the Company's office, 69 Clark street, Chicago; also at the Company's office in Great Central Depot, foot of Lake street, and at Indiana avenue and Canal street stations, at as low rates as by any other route.

ROBERT HARRIS,
General Superintendent,
CHICAGO.

D. W. HITCHCOCK,
Gen'l Pass. Agent,
CHICAGO.

CHICAGO, MILWAUKEE & ST. PAUL RAILWAY.

THE DIRECT ROUTE TO
MILWAUKEE, ST. PAUL AND MINNEAPOLIS,
And all portions of Wisconsin, Minnesota and Northern Iowa.

Purchase Tickets Via Milwaukee.

Passengers going via this NEW DIRECT ROUTE to Milwaukee leave from and arrive at the most Central and best located Depots in Chicago, Milwaukee and St. Paul.

BAGGAGE CHECKED THROUGH BY THIS ROUTE!

Passengers from Chicago can obtain these Advantages only by taking the trains of Chicago, Milwaukee & St. Paul Railway, at Union Depot, corner West Madison and Canal streets.

SPECIAL NOTICE.

This Line connects more important Business Centres than any other route in the Northwest, is as short as the shortest, and is fully equipped with the best of Day and Sleeping Coaches.

A. V. H. CARPENTER,
Gen. Passenger Agent, Milwaukee,
T. E. CHANDLER,
Passenger and Ticket Agent, 37 West Madison street, Chicago.

S. S. MERRILL,
Gen. Manager, Milwaukee.

CHICAGO & NORTHWESTERN RAILWAY.

This great corporation now owns and operates over two thousand miles of road radiating from Chicago like the fingers of a man's hand, its lines reach in all directions and cover about all of the country north, northwest and west of Chicago. With one branch it reaches Racine, Kenosha, Milwaukee and the country north thereof; with another line it pushes through Janesville, Watertown, Oshkosh, Fond du Lac, Green Bay, Escanaba to Negaunee and Marquette; with another line it passes through Madison, Elroy and for St. Paul and Minneapolis; branching westward from Elroy it runs to and through Winona, Owatonna, St. Peter, Mankato, New Ulm, and stops not until Lake Kampoka, Dakota, is reached; another line starts from Chicago and runs through Elgin and Rockford to Freeport, and, via the Illinois Central, reaches Warren, Galena and Dubuque; and the country beyond. Still another line runs almost due westward, and passes through Dixon, Sterling, Fulton, Clinton (Iowa), Cedar Rapids, Marshalltown, Grand Junction, Missouri Valley Junction, to Council Bluffs and Omaha. This last-named is the "Great Trans-Continental Route," and the pioneer overland line for Nebraska, Colorado, Utah, Idaho, Montana, Nevada, California and the Pacific Coast. It runs through the Garden of Illinois and Iowa, and is the best, safest, shortest and quickest route for Omaha, Lincoln and other points in Nebraska, and for Cheyenne, Denver, Salt Lake City, Virginia City, Carson, Sacramento, San Francisco, and all other points west of the Missouri River.

On the arrival of the trains from East or South, the trains of the Chicago & Northwestern Railway leave CHICAGO as follows:

For Council Bluffs, Omaha and California—Two through trains daily, with Pullman Palace Drawing-Room and Sleeping Cars through to Council Bluffs.

For St. Paul and Minneapolis—Two through trains daily, with Pullman Palace Cars attached to both trains.

For Green Bay and Lake Superior—Two trains daily, with Pullman Palace Cars attached and running through to Marquette.

For Milwaukee—Four through trains daily. Pullman Cars on night trains. Pullman parlor chair cars on day trains.

For Winona and points in Minnesota—One through train daily, with Pullman sleepers to Winona.

For Dubuque via Freeport—Two through trains daily, with Pullman Cars on night train.

For Dubuque and La Crosse via Clinton—Two through trains daily, with Pullman cars on night train to McGregor, Iowa.

For Sioux City and Yankton—Two trains daily. Pullman cars to Missouri Valley Junction.

For Lake Geneva—Four trains daily.

For Rockford, Sterling, Kenosha, Janesville and other points you can have from two to ten trains daily.

MARVIN HUGHITT,
Superintendent.

W. H. STEWART,
General Passenger Agent.

CHICAGO & ALTON RAILROAD,

THE ONLY FIRST-CLASS ROAD IN THE WEST.

(See Classification of Railroads by Board of Railroad Commissioners.)

CHICAGO, KANSAS CITY AND DENVER SHORT LINE

Via Joliet, Bloomington & Jacksonville, Ill., Crossing the Mississippi on the Great Iron Bridge at Louisiana, Mo., and

CHICAGO, SPRINGFIELD, ALTON & ST. LOUIS

THROUGH LINE.

| Leave. | Arrive. |
|--|----------------|
| 12:00 noon*.....Kansas City and Denver Fast Ex. via Jacksonville, Ill., and Louisiana, Mo..... | 3:10 p.m. |
| 9:30 a.m.*.....St. Louis Ex. via Main Line..... | 7:50 p.m. |
| 9:40 p.m.*.....St. Louis and Texas Fast Ex. via Main Line..... | 7:50 p.m. |
| 9:50 a.m.*.....Springfield Express..... | 7:50 p.m. |
| 9:45 p.m.*.....Springfield Fast Express..... | 7:50 p.m. |
| 9:30 a.m.*.....Peoria Day Express..... | 7:50 p.m. |
| 9:30 a.m.*.....Chicago & Paducah B. & O. Ex..... | 7:50 p.m. |
| 12:00 noon*.....Streator, Wanamaker, Lacon & Wash. Ex..... | 8:10 p.m. |
| 4:30 p.m.*.....Joliet and Dwight Acc..... | 9:20 a.m. |
| *Ex. Saturdays. | *Ex. Sundays. |
| *Ex. Mondays. | *Ex. Tuesdays. |

The best and Quickest Short Route from Chicago to

KANSAS CITY, DENVER,

Lawrence, Topeka, Fort Scott, St. Joseph, Atchison, Leavenworth, St. Louis, Springfield, Jefferson City and all points West and South.

The only Line running Reclining Seat Palace Cars between Chicago and Kansas City, without change. No extra charge for seats in these cars, which are as comfortable as Palace Sleeping Cars. Pullman Palace Sleeping Cars run through between Chicago and Kansas City, without change.

CLOSE CONNECTIONS

In Union Depot, Kansas City, with all Western Roads for Kansas, Colorado, New Mexico, and California; and in Chicago

WITH TRAINS OF ALL ROADS TO AND FROM THE EAST AND NORTH.

The shortest, best and quickest route, and the only route running Pullman Palace Sleeping Cars and three Express Trains daily, and a Saturday Night Train to Springfield and St. Louis, and making the time to St. Louis in eleven hours.

The only line to SPRINGFIELD, ST. LOUIS and JEFFERSON CITY under ONE MANAGEMENT.

The Great Southern All-Rail Line, via St. Louis and Iron Mountain Route.

PULLMAN PALACE SLEEPING CARS Run on this Route Only from Chicago to New Orleans, with but One Change.

THE SHORT LINE TO TEXAS!

via St. Louis.

DINING CARS on all Day Trains.

JAMES CHARLTON,
Gen. Pass. and Ticket Agent, Chicago.

J. C. McMULLIN,
Gen. Supt., Chicago.

ILLINOIS CENTRAL RAILROAD.

Trains Leave Chicago from The Great Central Depot, foot of Lake Street
CHICAGO AND ST. LOUIS THROUGH LINE.

No Change of Cars to St. Louis!

8:50 A. M. DAY EXPRESS. Sundays Excepted. Arriving at St. Louis at 8:10 A. M.
10:30 P. M. FAST LINE. DAILY. Arriving at St. Louis at 8:10 A. M.

CAIRO, MEMPHIS, MOBILE AND NEW ORLEANS LINE.

No Change of Cars to New Orleans!

8:50 A. M. DAY EXPRESS. Sundays Excepted. Arriving at Cairo 3:00 A. M.;
Memphis, 3:35 P. M.; Vicksburg, 10:10 A. M.;
Mobile, 7:45 A. M.; and New Orleans at 10:30 A. M.
5:15 P. M. GILMAN PASSENGER. Sundays Excepted. Arriving at
Cairo 3:30 P. M.; Memphis, 3:45 A. M.

8:40 P. M. NIGHT EXPRESS. DAILY. Arriving at Cairo 3:30 P. M.; Memphis, 3:45 A. M.;
and New Orleans at 11:30 P. M.
This Route is from 100 to 175 MILES SHORTER and from 12 to 24 HOURS QUICKER than any other.

PEORIA AND KEOKUK LINE.

8:50 A. M. EXPRESS. Sundays Excepted. Arriving at El Paso 2:22 P. M.; Peoria 4:30 P. M.
8:40 P. M. EXPRESS. Sundays Excepted. Arriving at El Paso 2:48 A. M.; Peoria 4:10 A. M.
Keokuk 10:10 A. M.; Warsaw 10:45 A. M. Sleeping car from Chicago to Keokuk.

CLINTON AND SPRINGFIELD LINE.

8:50 A. M. DAY EXPRESS. Sundays Excepted. Arriving at Springfield at 4:50 P. M.
8:40 P. M. NIGHT EXPRESS. DAILY. Arriving at Springfield at 4:30 A. M.
A sleeping car runs in this train from Chicago to Springfield.

DUBUQUE AND SIOUX CITY LINE.

9:25 A. M. DAY EXPRESS. Sundays Excepted. Arriving at Dubuque 6:55 P. M.; Waterloo, 11:45 P. M.; Fort Dodge, 4:40 A. M.; Sioux City, 11:00 A. M.
9:25 P. M. NIGHT EXPRESS. Sundays Excepted. Arriving at Dubuque 6:55 A. M.; Waterloo, 11:30 A. M.; Fort Dodge, 4:35 P. M.; Sioux City, 4:10 A. M.

This is the only Route to Dubuque and Sioux City without Change.
For Tickets, Sleeping Car Berths and information, apply at the Illinois Central Railroad Ticket Office 121 Randolph street, near Clark, and at the Central Depot, foot of Lake street.

W. P. JOHNSON, Gen. Pass. Agt. J. F. TUCKER, Gen. Supt.

ILLINOIS CENTRAL FREIGHT DEPARTMENT.

Freight taken for St. Louis, and points West and Southwest. For Hamilton and all points on the M. & T. R. R. for all landings on the Mississippi, Red and White Rivers, via Cairo and regular packets. The ONLY RAIL LINE TO MEMPHIS AND NEW ORLEANS, with

CARS RUN THROUGH WITHOUT CHANGE.

via the N. O., St. L. & O. R. R. and, by its connection at Frost, Tenn., the Direct Route to all points reached by the Great Line of the South; to Mobile, and points on the M. & O. R. R. via Jackson, Tenn., to Dixon, Freeport, Warren, Galena, Dunleith, and all landings on the Upper Mississippi during season of navigation, and without change of cars to Dubuque, Waterloo, Fort Dodge and Sioux City, Iowa; Vermillion and Yankton, Dakota Territory; and via Missouri Packets to points on the Upper Missouri.

Bills Lading and Rates furnished upon application at 121 RANDOLPH street, or foot of South Water street.

HORACE TUCKER, Acting General Freight Agent.

WISCONSIN CENTRAL RAILROAD.

GARDNER COLBY, Pres., Boston, Mass. E. H. ABBOTT, Treas., Boston, Mass.

Built and operated by Phillips & Colby Construction Company. E. B. Phillips, Pres. and Gen. Manager Milwaukee; Charles L. Colby, Land Commissioner, Milwaukee; E. Bacon, Asst. Superintendent, Milwaukee; Henry Pratt, Auditor and Gen. Ticket Agent, Milwaukee.

OFFICES: Milwaukee, Wis., and 25 State Street, Boston, Mass.

This road is in process of construction from Lake Michigan and Portage City (via Stevens Point) Lake Superior, and to Prescott on the Mississippi River. Parts of the Eastern and Middle Divisions are in operation, and trains run as follows:

| MIXED. | EXPRESS. | PAS-SENGER. | Leave. | Arrive. | PAS-SENGER. | EXPRESS. | MIXED. |
|------------|-------------|-------------|-------------------------------|---------|-------------|-------------|------------|
| 6:30 A. M. | 12:10 P. M. | 9:00 P. M. | Leave.....Milwaukee..... | Arrive | 6:25 A. M. | 12:20 P. M. | 7:45 P. M. |
| 7:55 | 8:55 | 8:30 A. M. | Arrive.....Green Bay..... | Leave | 8:35 P. M. | 6:40 A. M. | 1:00 |
| 6:30 | 8:10 | 7:25 A. M. | Arrive.....Menasha..... | Leave | 8:35 P. M. | 7:25 A. M. | 7:40 |
| 1:15 | ..... | 11:10 A. M. | Arrive.....Stevens Point..... | Leave | 4:50 P. M. | ..... | ..... |
| ..... | ..... | 2:55 P. M. | Arrive.....Colby..... | Leave | 1:25 P. M. | ..... | ..... |
| ..... | ..... | 8:00 P. M. | Arrive.....Worcester..... | Leave | 12:10 A. M. | ..... | ..... |

* Daily except Sunday.

* Daily except Saturday.

* Sup

COMFORTABLE SLEEPING CARS ON ALL NIGHT TRAINS.

Trains Arrive at and depart from UNION DEPOT, MILWAUKEE, Read street, Western Union Station.
Connections: At Milwaukee, with Chicago, Milwaukee & St. Paul, and Northern Union Railways; at Plymouth, with Sheboygan & Fond du Lac Railroad, for Fond du Lac and Sheboygan; at Green Bay, with Green Bay & Minnesota Railway, for New London, and Chicago & Northwestern Railway, for points North; at Amherst Junction, with Green Bay & Minnesota Railway, for Grand Rapids and points West; at Junction City, with Wisconsin Valley Railway, for Wausau.

NATIONAL TUBE WORKS COMPANY,

SOLE MANUFACTURERS OF
MACK'S PATENT INJECTORS,
 WITH ALL LATEST IMPROVEMENTS
 NOW BEING USED BY SEVERAL LEADING RAILROADS
ON THEIR FASTEST TRAINS,
 Without the Use of the Pumps.

BOSTON—No. 9 Pemberton Square.
 NEW YORK—No. 78 William Street.

CHICAGO—Nos. 112, 114 and 116 Lake Street.
 CINCINNATI—Nos. 119, 121 and 123 Pearl Street.
 McKeesport, Pa., near Pittsburgh.

ESTABLISHED 1848.

WILLIAM SELLERS & CO. PHILADELPHIA.

Machine and Railway Shop Equipments, Turn Tables,
 Pivot Bridges, Shafting, Etc.

GIFFARD'S INJECTOR—SELLERS' IMPROVEMENTS.

NEW PATTERNS, SIMPLE, EFFECTIVE.

| | | | | | | | |
|------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|
| No. 2. 10 H. P., \$18. | No. 3. 25 H. P., \$25. | No. 4. 45 H. P., \$35. | No. 5. 70 H. P., \$45. | No. 6. 100 H. P., \$55. | No. 7. 140 H. P., \$65. | No. 8. 190 H. P., \$75. | No. 10. 275 H. P., \$95. |
|------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|

Send for circular giving particulars.

Branch Office, 93 Liberty Street, New York.

CRERAR, ADAMS & CO., Railroad Supplies and Contractors' Materials,

AGENTS FOR ALL KINDS OF
 SHEET COPPER AND BRASS FOR

LOCOMOTIVE WORK AND COPPERSMITHS,

Nos. 11 and 13 Fifth Avenue, Chicago, Ill.

Manufacturers of IMPROVED HEAD LIGHTS for Locomotives, Hand and Signal Lamps, Car and
 Station Lamps, Brass Dome Castings, Dome Mouldings, Cylinder Heads and Car Trimmings of every
 description.

MIDVALE STEEL WORKS.

Works and Office, NICETOWN, Philadelphia, Pa.



MANUFACTURERS OF

Crucible and Open Hearth Steel,
 Steel Locomotive Tires, Steel Axes of Every Description, Steel Forgings, up
 to 8,000 lbs. in Weight, Solid Steel Castings, Hammer Dies,
 Frogs, &c. Best Tool, Machinery and Spring Steels.

WM. SELLERS, Pres. MARRIOTT C. SMITH, Sec'y and Treas. CHAS. A. BRINLEY, Sup't.

Edge Moor Iron Co.,

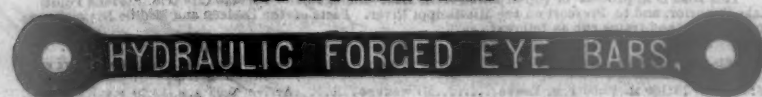
(Works at Edge Moor, on Delaware River,
 Post Office, Wilmington, Delaware.)

MANUFACTURE ALL KINDS OF

IRON WORK

FOR

BRIDGES, ROOF TRUSSES AND BUILDINGS.
SPECIALTIES:



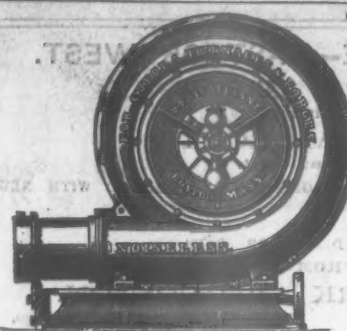
HYDRAULIC FORGED EYE BARS.
HYDRAULIC FORGINGS and
HYDRAULIC RIVETED WORK.

Specifications from Railroad Companies, Engineers and Contract-
 ors solicited, upon which estimates will be promptly furnished.

WILLIAM SELLERS,
 President.

ELI GARRETT,
 Sec'y & Treas'r.

GEORGE H. SELLERS,
 Gen'l Sup't.



The Sturtevant Blower

Adapted for all purposes for which Blowers
 are required.

The BEST and the CHEAPEST Blower made,
 in proportion to its capacity.

SEND FOR ILLUSTRATED CATALOGUE.

B. F. STURTEVANT,

Patentee and Sole Manufacturer

70 & 72 Sudbury St., Boston, Mass.



What they say in Europe.

From Messrs. G. W. MURRAY & Co., Engineers, Iron Founders and Ma-
 chinists, Manufacturers of Agricultural Implements, &c.

BANFF FOUNDRY, Scotland, May 3, 1875.

"We have now had a few trials of your Tanite Emery Wheels, having used
 them over 12 months. The ordinary shaped ones (square edges) for dress-
 ing castings and general work; those you specially made for us, we use
 for dressing the teeth of fine pitched wheels. The first cost being so
 high, and the rapid way they wear, made us give them up at first and go
 back to the London made emery wheels; but our men (who do the work
 by piece) agreed to reduce the price so much, if we would supply them, as
 they said, 'with the fine kind of wheels they had lost,' that the reduction does
 more than pay for the wheels altogether." Address
 THE TANI-E COMPANY, Strassburg, Monro Co., Pa.

PRATT'S COMPENSATING FISH-PLATE JOINTS.



Spring nut.

Spring washer.

Track Bolts and Nuts are constantly subjected to a vibration and jar. One large item of expense is
 for wrench-work and replacement of bolts and nuts already off.

Most of the contrivances for removing this trouble are failures. They do not remove the cause of
 the trouble. This can only be done by some elastic material, which will absorb the vibration and pre-
 vent its reaching the nuts. Experience proves that permanent elasticity cannot be obtained by using
 wood, which is perishable, or steel, which cannot be made of uniform temper. In our inventions, the
 elastic packing of rubber between the nut and the plate absorbs the jar or vibration, insulates the nut,
 and by removing the cause of the trouble, removes the trouble itself. The rubber is kept in perfect
 shape, protected from the weather and other destructive agencies, and its elasticity is retained for
 many years.

Among the advantages are these:

- 1st. It saves the expense of wrench-work and loss of nuts.
- 2d. The rubber absorbs the blow given by the wheels at the joint in such manner as
 to lessen the liability of rails to fracture at the joint, and accidents resulting therefrom.
- 3d. The track is made noiseless.
- 4th. Rails are saved from pounding out at the ends, and the thread of the bolts and
 nuts from stripping.

The practical value of these inventions can, however, best be ascertained from the officials
 of the thirty leading roads, which have made a general adoption of them, after giving them
 a trial in competition with other contrivances, and have now in use more than 4,000,000
 joints of this character.

PRATT'S SPRING NUT is also used on Bridges, Car Trucks, Switch and other bolts where the com-
 mon nut is liable to turn off. All material used in the manufacture warranted to be of the best.
 Manufactured and sold by

THE PRATT MANUFACTURING COMPANY,

No. 71 BROADWAY, NEW YORK.

Manufacturers and Dealers in all kinds of Railway Track Supplies; also, New
 York Agents for the Tattle and Whittemore Co., Houghton, Conn., Manu-
 facturers of Reformed Malleable Iron Castings, from Patterns to order. Special
 attention given to Malleable Iron Castings for Railroad Car Construction.

BLAKE'S STEAM PUMPS.

8,000 IN USE!



COMBINED PUMP AND BOILER
 A SPECIALTY.

For RAILROAD WATER STATIONS, &c.

Send for Illustrated Catalogue.

GEO. F. BLAKE MANUFACTURING CO

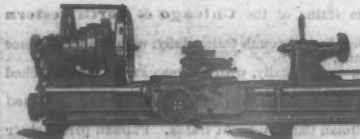
55 & 57 Liberty St., New York.

BOSTON CHICAGO

Cor. Canaway & Friend Sts. 150 & 51 South Canal St.

FERRIS & MILES

MANUFACTURERS OF



Engine Lathes, Axle Lathes, Planing and Slotting
 Machines, Wheel Bore, Upright Drills, Ra-
 dial Drills, Punching and Shearing
 Machines, &c. Steam Ham-
 mers, Drops, &c.

TWENTY-FOURTH AND WOOD STREETS
 PHILADELPHIA.

ESTABLISHED 1820.

PATENT TRANSITS.

W. J. YOUNG & SONS,

Engineering Instrument Makers,

43 NORTH SEVENTH STREET,

Philadelphia.

Tapes, Chains, Draughting Instru-
 ments. Catalogues on application.

JAMES PRENTICE,

164 Broadway, New York.

Manufacturer of Transits, Sur-
 veyors' Levels, and Compasses,
 Land Chains, Station Staffs, &c.
 &c.

A large assortment on hand
 warranted for quality and at
 reasonable prices.

F. BRANDIS & CO.

FORMERLY WITH STACKPOLE & BRO.
 Surveying, Engineering and Astronom-
 ical Instrument Manufacturers.

Theodolites, Transits, Levels, Sextants,
 Tapes, Rods, Chains, &c., &c.

All kinds of Instruments repaired and re-divided in
 the most accurate manner.

100 Fulton, corner William Street, New York.
 Having withdrawn our agency from Kouss &
 Esser, all orders will be filled directly by us.

HELLER & BRIGHTLY, Engineering and
 Surveying Instruments, 53 N. Seventh St., Phila.

Without decreasing size of any
 part of our "Engineering" Transits
 we have reduced the weight one-
 half. An ordinary Transit Tele-
 scope magnifies from 10 to 12 diam-
 eters, our new Transit Telescope
 (length 10 1/2 inches, shows objects
 erect and not inverted) magnifies
 25 diameters and will read time on a
 watch-dial at 953 feet. For de-
 scription of our new Mining Transit
 (weight 6 1/2 lbs.) and Plummet
 Lamp, see Van Nostrand's Engi-
 neering Magazine, June, 1875.

Extract from report of Committee
 of Civ. Eng. appointed by Frank-
 lin Inst. to examine H. & B.'s new
 Transit (Dec. 1871): "It exhibits
 several novelties of construction
 which, in the opinion of the committee, render it supe-
 rior to those now in use, and in its opinion the deviations
 which they have made from the common styles of Transit
 are decided improvements."

JOHN G. CHARTWELL, Chairman.

Descriptive and Illustrated Price List sent Post-paid on
 Application.



General Passenger Agent.

at Amherst Junction, with Green Bay & Minnesota Railway, for Grand Rapids and points West; at Juneau, with Wisconsin Valley Railway, for Wausau.